CoEvolution

The Supplement to the Whole Earth Catalog

"COEVOLUTION"

The term was introduced in 1965 by Paul Ehrlich and Peter Raven in their study of the predator-prey relationship of caterpillars and plants. They found that the eaters and the eaten progressively evolved in close response to each other— coevolved. (Some plants developed defensive alkaloid poisons. Some caterpillars acquired a taste for alkaloids. The plants diversified wildly. The caterpillars diversified with them. What evolved really was the relationship, stably dynamic, unpredictable and sure.)

It seems that all evolution is coevolution. The beauty of the term is what it adds to the concepts of ecology. Language such as "preserving the ecology" suggests something quite perfect— static, knowable, oriented backward, unwelcoming to human foolishness... unreal. Ecology is whole system alright, but coevolution is whole system in TIME. The health of it is forward— systemic self-education which feeds on constant imperfection. We coevolving watchers and meddlers are not left out of it.

Ecology maintains.
Coevolution learns.

A COEVOLUTIONARY GAME:
Who's Got the Cardiac Glycoside?

For chemical defense against predators, plants of the Milkweed family learned to synthesize a potent poison, the cardiac glycosides. The Monarch butterfly caterpillar learned to relish this alkaloid. The adult Monarch, full of cardiac glycosides, tasted terrible to his predators, the birds. The nice-tasting Viceroy butterfly learned to mimic the orange-and-black appearance of the Monarch so birds would leave him alone too. The birds, presumably, learned to distinguish more acutely between the real and bogus Monarchs. And the Milkweeds, meanwhile, learned to vary the combinations of alkaloids in individual plants so that caterpillars adapted to one plant could not feed on another. So long as everyone gets some victory and some defeat, the game never stops.

A COEVOLUTIONARY GAME:

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(**The CoEvolution Quarterly** *will pay $20 for each CoEvolutionary game sent to us and published. The players may be life forms, organs, ideas, cultures, inventions, techniques, you name it and connect the circuit.)*

Supplement to the Whole Earth Catalog

The CoEVOLUTION Quarterly

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Headnotes

1. *Research toward a WHOLE EARTH EPILOG has been in progress since September 73. This Supplement is part and parcel of it. The EPILOG, effectively Volume II to THE LAST WHOLE EARTH CATALOG, looks now like it will be about 320 pages, $4, available in the Fall 1974. Publisher is POINT. Distributor is still being decided.*

2. *This issue— the first— of* **The CoEvolution Quarterly** *was assembled by Stewart Brand, Andrew Fluegelman, Diana Shugart, Pam Cokeley, Steamboat, David Wills, Joe Bacon, and Rick Fields in Sausalito, California during February and March, 1974.*

3. *Front and back covers are by Arthur Okamura. The front was done with white chalk on black paper— especially for* **The CQ**. *Back cover is a silk screen print. Arthur shows regularly at the Hansen-Fuller Gallery in San Francisco.*

4. *THE Updated LAST WHOLE EARTH CATALOG exhaustively corrected by Pam Cokeley (3000 changes), will be available this Spring in bookstores, still at $5.*

5. *The Whole Earth Truck Store is still in business, still filling mailorders from the CATALOG.*
   Whole Earth Truck Store
   558 Santa Cruz
   Menlo Park, Ca 94025
   Also address SUBSCRIPTIONS for **The CQ** *($6/yr for four issues) to the Truck Store.*

6. **The CoEvolution Quarterly** *invites your editorial correspondence.*
   The CQ
   Box 428
   Sausalito, Ca 94965

7. *The April 1974 issue of* **Harper's Magazine** *contains fifteen pages of preliminary WHOLE EARTH EPILOG and* **The CoEvolution Quarterly**— *material not reprinted here.*

If the prospect of a cold hard future is making you feel sorry for yourself, imagine how you would feel wearing this shirt, and cheer up.

Apocalypse Juggernaut, hello.

Short Term Forecasting

We print well-founded rumors.

The first two come from recent conversation with ex-General Gavin, who presently heads the Arthur D Little research corporation. Says he:

★ Food will be short in the U.S. by next winter. Not just expensive but short. Sugar and molasses will be the first to disappear. The major reasons is shortages of petroleum-based fertilizers. The current run on beef (wheat-fed) is doing in the wheat supply.

★ Also, says Gavin, expect massive federal spending programs from an administration that is terrified enough of a recession to try and buy its way out.

★ As we mentioned in Harper's, *vegetable seeds are scarce this Spring. The Burpee Company warned us to buy early or forget it.*

★ Signs are that the climate will be getting steadily worse for several decades at least. It will be colder in the temperate zones and dryer near the equator, causing widespread famine in countries dependent on the monsoon cycle— Africa, India, South Asia, parts of Central America. The problem is that the recent 50 years of good weather (the best in a thousand years) is returning to normal— much colder.

(Paul Ehrlich first alerted us to the significant prophet, Reid Bryson, head of the Institute for

A disrupted monsoon cycle leads directly to:

Africa 'Marshall Plan' asked

Associated Press

LAGOS (Nigeria) — UN Secretary General Kurt Waldheim said yesterday "a global approach like the Marshall Plan" is needed to aid drought-ravaged nations in West Africa.

"We need a dramatic relief operation," he added.

Waldheim was addressing newsmen shortly before his departure for Dahomey, following a three-day visit here and talks with Nigerian military ruler Gen. Yakubu Gowon.

Waldheim warned that several of the nations hardest hit by the drought could be wiped off the face of the map by the advancing Sahara before the end of the century.

The U.N. Food and Agriculture Organization estimates six million Africans may be threatened by death from famine. Of an estimated population of 30 million in the six countries about a third are said to be weakened by hunger and malnutrition.

Waldheim said Western donor nations were currently studying $1.5 billion worth of long-range rehabilitation programs for the sub-Sahara area which includes Mauritania, Senegal, Mali, Upper Volta, Niger and Chad.

Mauritania is probably the hardest hit. Government officials estimated the cereal crop was only one - third that of a normal year or 30,000 metric tons. Some officials say about half the country's one million cattle have perished, along with thousands of sheep and camels, the basis of the traditional economy.

Bradford Morse, UN Undersecretary - General, is touring potential donor nations with a list of 125 specific projects to aid the region, Waldheim said, including proposed huge dams on the Senegal and Niger Rivers, vast irrigation schemes, and well digging programs.

IN BRIEF

Bombay cops kill 7 food rioters

BOMBAY — Police fired on mobs rampaging across Bombay in food riots late Friday night, killing seven persons and wounding 25 others, officials said yesterday.

Marchers burned shops and public buses, set fire to police vehicles, roughed up police officials and hurled rocks at police to show their anger with the govenrment's failure to halt food price increases.

In neighboring Gujarat, home state of the late Mohandas K. Gandhi, mob violence continued for the 45th day in a row.

Environmental Studies at the University of Wisconsin. His crucial article "Drought in Sahelia" appeared in **The Ecologist**, *Oct 1973. An excellent summary of Bryson's work and other climatological bad news is "Ominous Changes in the World's Weather" in* **Fortune**, *Feb 1974— sent to us by Mike Phillips. It's worth studying for thinking about where you ought to live in the world. If Bryson's right, a billion people may starve: unpreventably.)*

★ *The dollar, feeble as it is, is now the solidest international currency, enjoying a land and energy base that the pound, yen, and European currencies lack.*

★ *The* **Wall St Journal** *reports (according to Melissa Padwa) that an increasing number of Americans have lost interest in paying taxes, following their President's example.*

★ *Keynsian economics— founded on demand— has had it. The economics to watch is the supply-based Input-Output modeling of Wassily Leontief and his assistant Anne P Carter. (Good articles in* **Forbes**, *Jan 1 1974 and* **Business Week** *Jan 19 1974— sent to us by Mike Phillips.) Input-Output lets you study how a shortage will multiply its effects throughout the economy. Ms. Carter predicts a depression. The Government, meanwhile, uses elaborate demand-based models (since you can supposedly manipulate demand) to make policy that will be increasingly surreal.*

★ *Appalachia is booming. The price of coal at the tipple, according to Bill Richardson, has gone up since October from $7 to $32/ton. "Everybody's coming back from Detroit."*

What have you heard that convinced you lately? Send it along.

'Predictiction Artists' needed

There is a "science" of future-study that is almost totally crap. The futurists don't even make it from month to month any more without surprises that threaten their whole premise structure.

Their principle premise is that trends continue. A much safer premise is that trends reverse, or invert. A squall of world-wide inversions is now in progress.

Who, if anybody, predicted any of this? I mean the details. (Those who were right about the big picture make up a pantheon that we should assemble and honor.) But who said how it would feel?

My nomination is Ayn Rand. Her novel **Atlas Shrugged** *(1957; 1084 pp; $1.75 from New American Library or Whole Earth Truck Store) anticipated in the fifties:*

- *Economic wobble and collapse.*
- *The drop-out phenomenon.*
- *Conspiracy as a way of life.*
- *Woman power.*
- *Governmental impotency.*
- *Communes.*
- *Oil boom in Colorado.*
- *Railroads to the fore.*
- *Atomic energy negligible.*
- *Mysticism as an issue.*
- *Industrial technology as an issue.*

What I particularly love is that this superbly intuitive writer holds the whole idea of intuition in contempt.

Other nominations?

Damn it, who is seriously thinking about how it's all going to be soon and how to live there and how to prepare now? Not just neo-pioneer fantasies. Not left-over World War II fantasies. Not Aquarian dreams. Not liberal nightmares. Just prudent taking of thought for the future.

Alternatively, who is seriously thinking about how to live in a situation where prediction is impossible?

—SB

Home Remedies

FOOD

The price of storable foods such as bulk rice and beans has quadrupled in recent months.

In view of likely food shortages by next winter, we recommend:

- *Some purchases of storable staples now— hoarding. (Beans are easiest.)*
- *Planting this Spring (buy seeds yesterday).*
- *Preservation in the Fall. (Don't rely totally on a freezer. Electricity could be intermittent.)*

The good ol Mormons have all the lore and a lot of the goods when it comes to food storage. The "Year's Supply"— 477 lbs of stashable eats— that Gary Snyder first suggested to us has gone up from $189.55 in 1971 (360 lbs) to $353.25 now.

Year's Food Supply

$353.25 (477 lbs FOB Salt Lake City)
from:
Perma-Pak
40 East 2430 South
Salt Lake City, Utah
84115

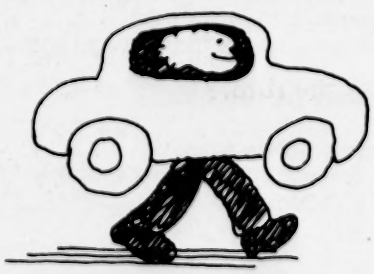
GASOLINE

★ *The most efficient way to save gas on your present vehicle is to install a vacuum gauge (costs about $16.50 at auto supply stores— not hard to install). It monitors fuel consumption by measuring engine-suck— lets you know when you're wasting gas on acceleration, high speeds, etc. (Suggested by Mike Phillips.)*

★ *Radial tires, besides providing better steering and tire longevity, will cut your gas consumption by 5-10%. There's less friction between tire and road.*

★ *Streamlining is surprisingly significant for mileage. Take off roof racks, radio antenas, camper backs, etc. when not in use. (Suggested by J. Baldwin.)*

Other suggestions?



Thermograte

Has anyone used one of these? They supposedly raise the heating efficiency of a fireplace by 50%. Popular Science suggests you might build your own with prebent exhaust pipe from J.L. Whitney, 1900-24 So. State St., Chicago Illinois 60616. Or order readymade, $64.50 to $99.50, from:

Thermograte
51 Iona Lane
St. Paul, Minn.
55117

(Sent by Kathy Mayer.)

Home heating and cooling

"Living With the Energy Crisis" covers in a few pages all the basics of making your house energy-efficient and costs only 25 cents from:

Small Homes Council— Building Research Council
University of Illinois
One East St. Mary's Rd.
Champaign, Illinois 61820

Pump Flashlights?

A source question: Do you have any leads on producers of pump flashlights? —the kind operated by a generater with a hand squeezing action? They're great for emergency use as they never go dead from storage as there is no battery to give out. Hammacher Schlemmer in NYC sells one but it is delicate & expensive (what do they sell that isn't). We need a rugged one that can take a lot of abuse. —I've seen one made some 20 yrs. ago but can't trace it. ! think many of your readers would enjoy knowing about it. If you don't know of one, how about putting a request in the catalogue for information.

Best

Bill Coperthwaite
Bucks Harbor, Maine

The Down Vest, Theory & Practice

If you're already a true believer in the virtue of down-filled nylon clothing— that poundwise it's a superbly efficient way to make maximum use of your body heat (an assumption which won't be re-examined here) you probably either (1) already own a down parka, or (2) are saving up for one.

The group (1) people know how well down parkas perform when they've got to tough it out in a snowdrift or at 12,000 feet. They also know how quickly they develop a near-fatal case of over-active armpits and flushed brow while wearing their parkas and trying to cross-country ski, chop wood or carry home the groceries. And those who grabbed for their parkas when the heat dwindled this winter probably discovered that it's not so easy functioning around the house with arms encumbered in the fashion of the Michelin man. For next winter's fuel crisis, and the variety of clement and inclement weather between now and then, group (2) people (and group (1) people with some dollars to spare) might consider a down vest.

A parka, with its cuffed sleeves, bottom drawstring and optional hood, keeps most stationary bodies comfortable at sub-freezing temperatures and active bodies at sub-zero. But when warmer weather or increased activity produces excess heat, the only way to let it out is to open the parka up or down the front. Either way, you end up going about your chores with your arms encased in down and your chest exposed to the elements— a pretty inefficient way to allocate all that efficient (and expensive) insulation. A down vest, on the other hand, creates a core of insulation where it's most needed and useful— around your body's central heating system, while affording your arms maximum freedom of movement. If your trunk is warm, your arms, like your legs, will take care of themselves, especially if they're they're doing work.

A vest combines beautifully with clothing you already have to adapt to a wide range of temperature/activity conditions. It's perfect for slipping over your workshirt when the sky clouds over or the wind picks up. Worn over a wool shirt, it will keep you very comfortable from 40 to 55 degrees. Wear it over a sweater and it will see you through down to freezing. Add a nylon or "60-40" cloth shell to that combination, and you've probably equalled or bettered the insulation provided by a light-to-medium weight parka— with more body mobility and the flexibility to adjust to changing conditions. Adding a vest to your other clothing also lets you keep your body in contact with a natural fiber garment— psychologically if not physiologically warmer. When not in use a vest in its stuff sack is about 1/3 more compact and lighter than a parka.

If you do decide to shop for a down vest, here are some things to look for:

**rip-stop nylon filled with 4 ozs. of goose or duck down. Pretty much standard. Virtually all vests have sewn-through seams. (If you're not particularly interested in saving on weight and bulk, a heavier grade nylon might wear better and be more resistant to the feathers' pushing through.)*

**snaps. These are more versatile closures than a zipper, and won't scratch or get in the way when you're working or lounging with the vest open.*

**well-insulated slash pockets. Effectively, down mittens always at your side. Make sure that the pocket corners are reinforced.*

**a high collar. Your neck is most vulnerable to heat loss.*

**a back flap. Keep your kidneys warm.*

The vest I purchased from Berkeley's North Face, designed by Mark Ericson, has all of the above features except the last, and served me well while we put together this issue of **The CQ** *in a damp and drafty crab shack on Richardson Bay. It costs a couple of dollars more than other vests I've seen that don't seem to measure up in features of workmanship. Our access listing below represents not so much an exhaustive evaluation of all available vests as a reference point for your own comparison shopping, and what we feel is a good value if you want to purchase by mail. Plan on saving about $15 under the cost of a lightweight down parka. Remember to get the vest large enough to fit comfortably over a heavy sweater.*

Don't read all of this as an unqualified smear campaign against parkas. Just think about what for and where you're probably going to be using your garment and whether you're going to want to carry around and pay for those well-stuffed sleeves. If you're planning on ice fishing or snow camping or buying a season's ticket to the Vikings, invest in a 3/4 length parka with a pound of down and good closures all around. And if you're in Billings or Minot you better have a good mummy bag handy for when the heating oil runs out completely. For less severe crises, consider a vest.

—AF

Down Vest

Rip-stop nylon, av. fill 6 oz. duck down, snaps, high collar, elastic waist band, S,M,L,XL; Blue, Green, Wine.

$24.00 plus postage from:
The North Face
P.O. Box 2399 Station A
Berkeley, Ca. 94702

Down Blanket

Our down blanket, because of shifting attitudes caused by the energy crises, is becoming one of our main items. They don't rely on power like an electric blanket does yet they have the highest warmth for weight of any of the bed coverings. Not only are they as warm as 4 wool blankets but the warmth is adjustable because the down compartments are vertical so that the down can be shaken down or up to suit the temperature requirements of the user. They have other features which endear them to those who have discovered them such as the fact that bed making time is cut about in half, and they have side and end flaps which keep them from sliding around on the bed. Ours cost from a third to half less than U.S. ones and yet are of the very highest quality in every respect.

We can't explain why Americans, who usually are so with-it about materials and how to use them, are just beginning to discover the down blanket which has traditionally been used and thought of as the ultimate bed covering in so much of Europe. But better late than never. They not only feel better than wool blankets but also free one from dependance upon electric power through the night.

Many thanks for writing to us.

Very best regards,

Warren Hayward
Antarctic Products Company Ltd.
P.O. Box 223
Nelson, New Zealand.

Apocalypse Juggernaut, hello.

Understanding Wholesome

Editorial reprinted with permission

Dear Dairy farmer,

Today's emphasis on shortages of all kinds has proven that more and more for the individual consumer involves a necessary reduction in the number of possible consumers. Dairy cattle have been slaughtered merely because the price of a pound of cow flesh overwhelms long-range profits to be made from milking the beast. The quick kill is shortsighted. Cowboyism is on the ropes and the horns of the dilemma posed by the return to "catch as catch can" living will be the ultimate demise of the world as we know it today. We have been guilty of repeated "tunnel vision" and our short-sightedness has lead us to a blank wall. The monetary haulacaust, inflation and consumer cynicism, have all contributed to lower quality and higher prices. The merchant suffers from loss of credibility. As the average citizen watches the turmoil created by the government and the big money makers, their disgust grows. A festering culture of distrust and anger will lead to a mass smash of status quo. We can no longer live only for the immediate buck, we must continually hold the whole image of the whole universe and our effect upon its delicate balance in the front of our minds at all time. Or as the great philosophers put it: "Spare the rod and spoil the cow." Amen.

No molesto. El vanish. Scramito. Vomitosis.

Message from Higher Intelligence

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Box 428, Sausalito, California 94965

ENERGY ECOLOGY & ECONOMIC$

BY HOWARD T. ODUM

Here, in full, is the hottest paper of '74, with, for its vast xerox-copy readership who have been wondering what the diagrams looked like, faithful reproductions of Odum's illustrations. (The paper was sent to us by John Todd and Mark Musick.)

Howard T. Odum is the author of Environment, Power and Society ($5.95 from Wiley, One Wiley Drive, Somerset NJ 08873 or Whole Earth Truck Store) and possibly the adeptest (and darkest) predictor around. In our view his conceptual approach is about one whole level more sophisticated than what's in **The Limits to Growth.**

Appended to the article is Odum's notes for a press conference held January 14, 1974 (sent to us by Tom Bender). Professor Odum teaches ecology at the University of Florida in Gainesville.

The non-diagrammatic illustrations were drawn for **The CQ** *by Russ Youngreen.*

–SB

As long-predicted energy shortages appear, as questions about the interaction of energy and environment are raised in legislatures and parliaments, and as energy-related inflation dominates public concern, many are beginning to see that there is a unity of the single system of energy, ecology, and economics. The world's leadership, however, is mainly advised by specialists who study only a part of the system at a time.

Instead of a single system's understanding, we have adversary arguments dangerous to the welfare of nations and the role of man as the earth's information bearer and programmatic custodian. Many economic models ignore the changing force of energy regarding effects of energy sources as an external constant; ecoactivists cause governments to waste energy in unnecessary technology; and the false gods of growth and medical ethics make famine, disease, and catalytic collapse more and more likely for much of the world. Some energy specialists consider the environment as an antagonist instead of a major energy ally in supporting the biosphere.

Instead of the confusion that comes from the western civilization's characteristic educational approach of isolating variables in tunnel-vision thinking, let us here seek common sense overview which comes from overall energetics. Very simple overall energy diagrams clarify issues quantitatively, indicating what is possible. The diagrams and symbols are explained further in a recent book (1).

For example, Figure 1 shows the basis of production in interaction of fuel reserves, steady energies of solar origin and feedback of work from the system's structure. Figure 1 is the computer simulation of this model for our existence, showing a steady state after our current growing period. As the fuel tank is drained, we return to a lower solar base of simpler agriculture. Simple macroscopic minimodels based on overview of world energy provides the same kind of trend curves as the detailed models of Forrester and Meadows (see Ref 2). With major changes confronting us, let us consider here some of the main points that we must comprehend so we may be prepared for the future.

1. THE TRUE VALUE OF ENERGY TO SOCIETY IS THE NET ENERGY, WHICH IS THAT AFTER THE ENERGY COSTS OF GETTING AND CONCENTRATING THAT ENERGY ARE SUBTRACTED.

Many forms of energy are low grade because they have to be concentrated, transported, dug from deep in the earth or pumped from far at sea. Much energy has to be used directly and indirectly to support the machinery, people, supply systems, etc

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The excellent special issue of **Ambio** *on energy in which this article appeared, costs $4 from Universitesforlaget, Box 307, Blindern, Oslo 3, Norway.*

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to deliver the energy. If it takes ten units of energy to bring ten units of energy to the point of use, then there is no net energy. Right now we dig further and further, deeper and deeper, and go for energies that are more and more dilute in the rocks. Sunlight is also a dilute energy that requires work to harness.

We are still expanding our rate of consumption of gross energy, but since we are feeding a higher and higher percentage back into the energy seeking process, we are decreasing our percentage of net energy production. Many of our proposed alternative energy sources take more energy feedback than present processes. Figure 2 shows net energy emerging beyond the work and structural maintenance costs of energy processing.

2. WORLDWIDE INFLATION IS DRIVEN IN PART BY THE INCREASING FRACTION OF OUR FOSSIL FUELS THAT HAVE TO BE USED IN GETTING MORE FOSSIL AND OTHER FUELS.

If the money circulating is the same or increasing, and if the quality energy reaching society for its general work is less because so much energy has to go immediately into the energy-getting process, then the real work to society per unit money circulated is less. Money buys less real work of other types and thus money is worth less. Because the economy and total energy utilization are still expanding, we are misled to think the total value is expanding and we allow more money to circulate which makes the money-to-work ratio even larger. Figure 3 shows the circulation of money that constitutes the GNP in a counter-current to the energy flow.

Figure 1 B. Graphs resulting from simulation of the model in Figure 1 A. Available world fuel reserve was taken as 5×10^{19} kilocalories and energy converted from the solar input and converged into man's productive system of growth and maintenance was 5×10^{16} kilocalories when structure was 10^{18} kilocalories. Peak of structural growth was variable over a 50-year period depending on amounts diverted into waste pathways.

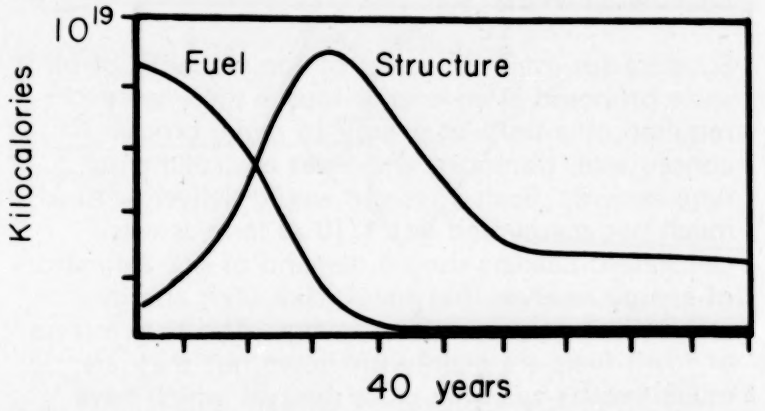


Figure 1 C. The steady state observed in some simulations of Figure 1 A was an oscillating one as in the graph shown here.

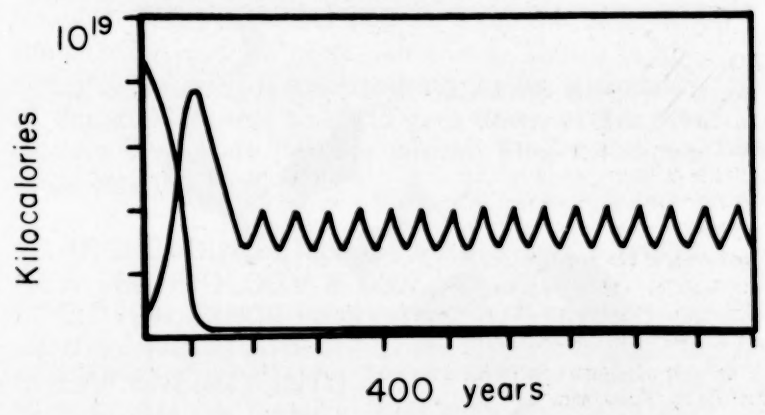


Figure 2. Energy flow diagram illustrating energy laws, and the difference between net and gross energy flows.

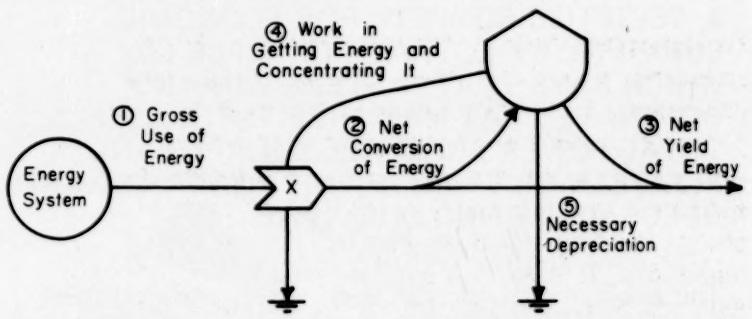

④ Work in Getting Energy and Concentrating It
① Gross Use of Energy
② Net Conversion of Energy
③ Net Yield of Energy
Energy System
X
⑤ Necessary Depreciation

Figure 3. Relationship of money cycles to the energy circuit loops.

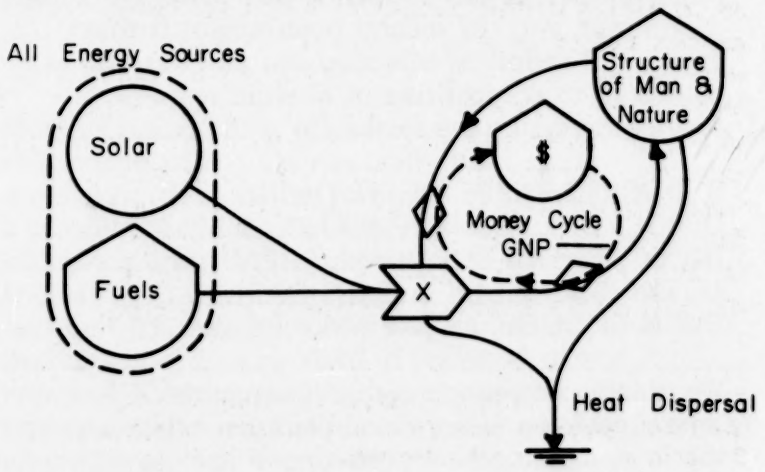
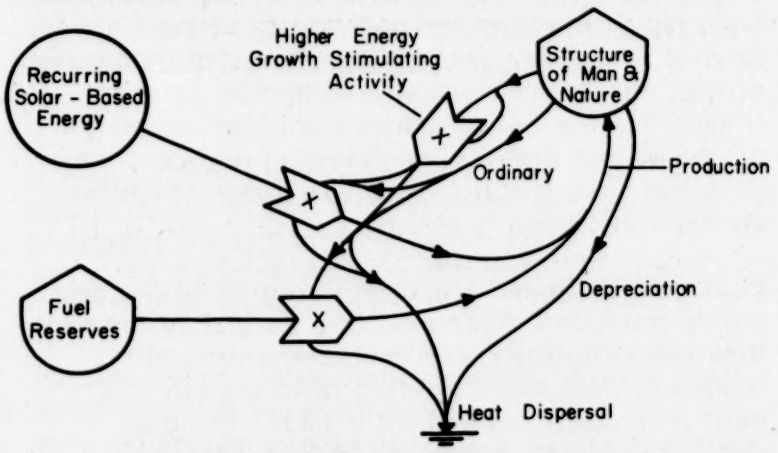
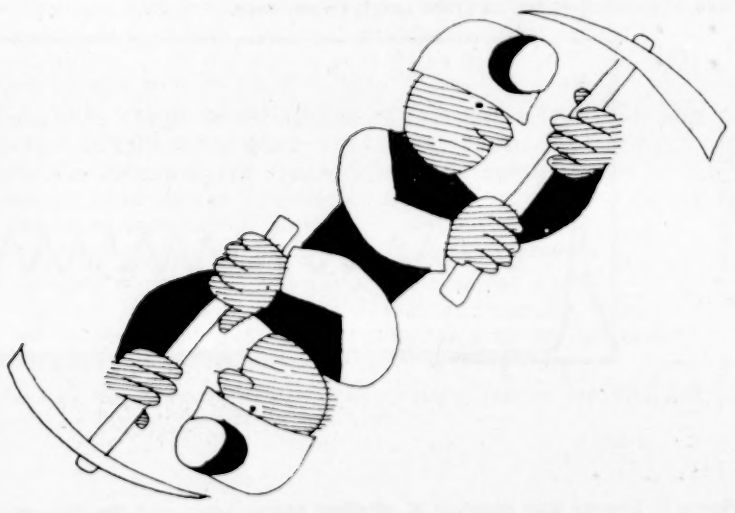


Figure 1 A. Generalized world model of man and nature based on one-shot fossil fuel usages and steady solar work. Pathways are flows of energy from outside source (circle) through interactions (pointed blocks marked 'X' to show multiplier action) to final dispersion of dispersed heat. The tank symbol refers to storage. Here world fuel reserve storage helps build a storage of structure of man's buildings, information, population, and culture.



3. MANY CALCULATIONS OF ENERGY RESERVES WHICH ARE SUPPOSED TO OFFER YEARS OF SUPPLY ARE AS GROSS ENERGY RATHER THAN NET ENERGY AND THUS MAY BE OF MUCH SHORTER DURATION THAN OFTEN STATED.

Suppose for every ten units of some quality of oil shale proposed as an energy source there were required nine units of energy to mine, process, concentrate, transport, and meet environmental requirements. Such a reserve would deliver 1/10 as much net energy and last 1/10 as long as was calculated. Leaders should demand of our estimators of energy reserves that they make their energy calculations in units of net energy. The net reserves of fossil fuels are mainly unknown but they are much smaller than the gross reserves which have been the basis of public discussions and decisions that imply that growth can continue.

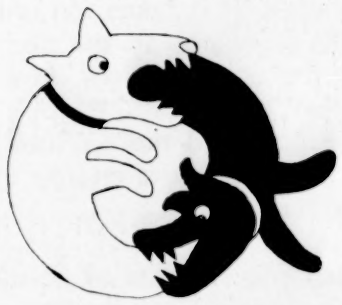


4. SOCIETIES COMPETE FOR ECONOMIC SURVIVAL BY LOTKA'S PRINCIPLE (3), WHICH SAYS THAT SYSTEMS WIN AND DOMINATE THAT MAXIMIZE THEIR USEFUL TOTAL POWER FROM ALL SOURCES AND FLEXIBLY DISTRIBUTE THIS POWER TOWARD NEEDS AFFECTING SURVIVAL.

The programs of forests, seas, cities, and countries survive that maximize their system's power for useful purposes. The first requirement is that opportunities to gain inflowing power be maximized, and the second requirement is that energy utilization be effective and not wasteful as compared to competitors or alternatives. For further discussion see Lotka (3) and Odum (1).

5. DURING TIMES WHEN THERE ARE OPPORTUNITIES TO EXPAND ONE'S POWER INFLOWS, THE SURVIVAL PREMIUM BY LOTKA'S PRINCIPLE IS ON RAPID GROWTH EVEN THOUGH THERE MAY BE WASTE.

We observe dog-eat-dog growth competition every time a new vegetation colonizes a bare field where the immediate survival premium is first placed on



rapid expansion to cover the available energy receiving surfaces. The early growth ecosystems put out weeds of poor structure and quality, which are wasteful in their energy-capturing efficiencies, but effective in getting growth even though the structures are not long lasting. Most recently, modern communities of man have experienced two hundred years of colonizing growth, expanding to new energy sources such as fossil fuels, new agricultural lands, and other special energy sources. Western culture, and more recently, Eastern and Third World cultures, are locked into a mode of belief in growth as necessary to survival. "Grow or perish" is what Lotka's principle requires, but only during periods when there are energy sources that are not yet tapped. Figure 3 shows the structure that must be built in order to be competitive in processing energy.

6. DURING TIMES WHEN ENERGY FLOWS HAVE BEEN TAPPED AND THERE ARE NO NEW SOURCES, LOTKA'S PRINCIPLE REQUIRES THAT THOSE SYSTEMS WIN THAT DO NOT ATTEMPT FRUITLESS GROWTH BUT INSTEAD USE ALL AVAILABLE ENERGIES IN LONG-STAYING, HIGH DIVERSITY, STEADY STATE WORKS.

Whenever an ecosystem reaches its steady state after periods of succession, the rapid net growth specialists are replaced by a new team of higher diversity, higher quality, longer living, better controlled, and stable components. Collectively, through division of labor and specialization, the climax team gets more energy out of the steady flow of available source energy than those specialized in fast growth could.

Our system of man and nature will soon be shifting from rapid growth as the criterion of economic survival to steady state non-growth as the criterion of maximizing one's work for economic survival (Figure 1). The timing depends only on the reality of one or two possibly high-yielding nuclear energy processes (fusion and breeder reactions) which may or may not be very yielding.

Ecologists are familiar with both growth states and steady state, and observe both in natural systems in their work routinely, but economists were all trained in their subject during rapid growth and most don't even know there is such a thing as steady state. Most economic advisors have never

seen a steady state even though most of man's million year history was close to steady state. Only the last two centuries have seen a burst of temporary growth because of temporary use of special energy supplies that accumulated over long periods of geologic time.

7. HIGH QUALITY OF LIFE FOR HUMANS AND EQUITABLE ECONOMIC DISTRIBUTION ARE MORE CLOSELY APPROXIMATED IN STEADY STATE THAN IN GROWTH PERIODS.

During growth, emphasis is on competition, and large differences in economic and energetic welfare develop; competitive exclusion, instability, poverty, and unequal wealth are characteristic. During steady state, competition is controlled and eliminated, being replaced with regulatory systems, high division and diversity of labor, uniform energy distributions, little change, and growth only for replacement purposes. Love of stable system quality replaces love of net gain. Religious ethics adopt something closer to that of those primitive peoples that were formerly dominant in zones of the world with cultures based on the steady energy flows from the sun. Socialistic ideals about distribution are more consistent with steady state than growth.

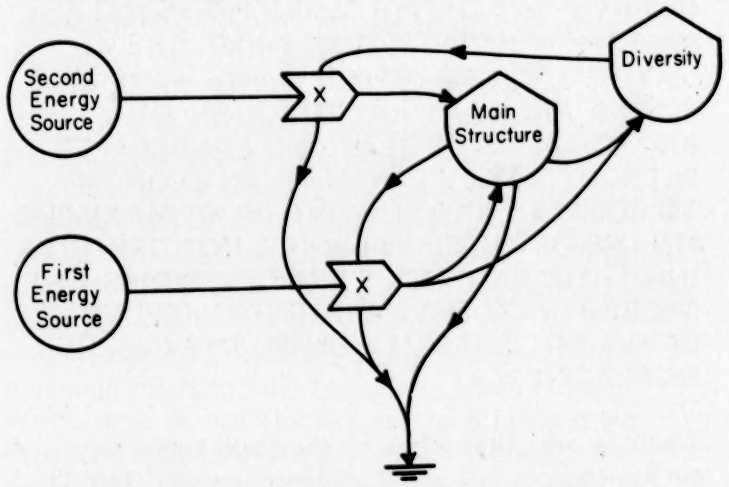
8. THE SUCCESSFULLY COMPETING ECONOMY MUST USE ITS NET OUTPUT OF RICHER QUALITY ENERGY FLOWS TO SUBSIDIZE THE POORER QUALITY ENERGY FLOW SO THAT THE TOTAL POWER IS MAXIMIZED.

In ecosystems, diversity of species develop that allow more of the energies to be tapped. Many of the species that are specialists in getting lesser and residual energies receive subsidies from the richer components. For example, the sun leaves on top of trees transport fuels that help the shaded leaves so they can get some additional energy from the last rays of dim light reaching the forest floor. The system that uses its excess energies in getting a little more energy, even from sources that would not be net yielding alone, develops more total work and more resources for total survival. In similar ways, we now use our rich fossil fuels to keep all kinds of goods and services of our economy cheap so that the marginal kinds of energies may receive the subsidy benefit that makes them yielders, whereas they would not be able to generate much without the subsidy. Figure 4 shows the role of diversity in tapping auxiliary energies and maintaining flexibility to changing sources.

9. ENERGY SOURCES WHICH ARE NOW MARGINAL, BEING SUPPORTED BY HIDDEN SUBSIDIES BASED ON FOSSIL FUEL, BECOME LESS ECONOMIC WHEN THE HIDDEN SUBSIDY IS REMOVED.

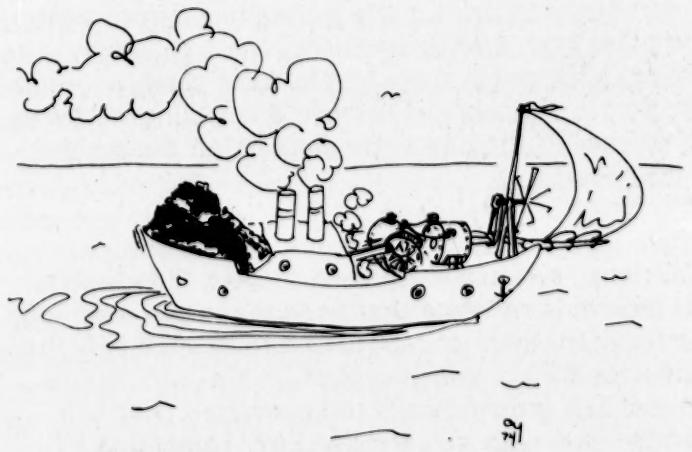
A corollary of the previous principle of using rich energies to subsidize marginal ones is that the marginal energy sources will not be as net yielding

Figure 4. Relationship of general structural maintenance to diversity and secondary energy sources.



later, since there will be no subsidy. This truth is often stated backwards in economists' concepts because there is inadequate recognition of external changes in energy quality. Often they propose that marginal energy sources will be economic later when the rich sources are gone. An energy source is not a source unless it is contributing yields, and ability of marginal sources to yield goes down as the other sources of subsidy become poorer. Figure 4 shows these relationships.

10. INCREASING ENERGY EFFICIENCY WITH NEW TECHNOLOGY IS NOT AN ENERGY SOLUTION, SINCE MOST TECHNOLOGICAL INNOVATIONS ARE REALLY DIVERSIONS OF CHEAP ENERGY INTO HIDDEN SUBSIDIES IN THE FORM OF FANCY, ENERGY-EXPENSIVE STRUCTURES.



Most of our century of progress with increasing efficiencies of engines has really been spent developing mechanisms to subsidize a process with a second energy source. Many calculations of efficiency omit these energy inputs. We build better engines by putting more energy into the complex factories for manufacturing the equipment. The percentage of energy yield in terms of all the energies incoming may be less not greater. Making energy net yielding is the only process not amenable to high energy-based technology.

11. EVEN IN URBAN AREAS MORE THAN HALF OF THE USEFUL WORK ON WHICH OUR SOCIETY IS BASED COMES FROM THE NATURAL FLOWS OF SUN, WIND, WATERS, WAVES, *ETC* THAT ACT THROUGH THE BROAD AREAS OF SEAS AND LANDSCAPES WITHOUT MONEY PAYMENT. AN ECONOMY, TO COMPETE AND SURVIVE, MUST MAXIMIZE ITS USE OF THESE ENERGIES, NOT DESTROYING THEIR ENORMOUS FREE SUBSIDIES. THE NECESSITY OF ENVIRONMENTAL INPUTS IS OFTEN NOT REALIZED UNTIL THEY ARE DISPLACED.

When an area first grows, it may add some new energy sources in fuels and electric power, but when it gets to about 50 percent of the area developed it begins to destroy and diminish as much necessary life support work that was free and unnoticed as it adds. At this point, further growth may produce a poor ability in economic competition because the area now has higher energy drains. For example, areas that grow too dense with urban developments may pave over the areas that formerly accepted and reprocessed waste waters. As a consequence, special tertiary waste treatments become necessary and monetary and energy drains are diverted from useful works to works that were formerly supplied free.

12. ENVIRONMENTAL TECHNOLOGY WHICH DUPLICATES THE WORK AVAILABLE FROM THE ECOLOGICAL SECTOR IS AN ECONOMIC HANDICAP.

As growth of urban areas has become concentrated, much of our energies and research and development work has been going into developing energy-costing technology to protect the environment from wastes, whereas most wastes are themselves rich energy sources for which there are, in most cases, ecosystems capable of using and recycling wastes as a partner of the city without drain on the scarce fossil fuels.

Soils take up carbon monoxide, forests absorb nutrients, swamps accept and regulate floodwaters. If growth is so dense that environmental technology is required, then it is too dense to be economically vital for the combined system of man and nature there. The growth needs to be arrested or it will arrest itself with depressed, poorly competing economy of man and of his environs. For example, there is rarely excuse for tertiary treatment because there is no excuse for such dense packing of growth that the natural buffer lands cannot be a good cheap recycling partner. Man as a partner of nature must use nature well and this does not mean crowd it out and pave it over; nor does it mean developing industries that compete with nature for the waters and wastes that would be an energy contributor to the survival of both.

13. SOLAR ENERGY IS VERY DILUTE AND THE INHERENT ENERGY COST OF CONCENTRATING SOLAR ENERGY INTO FORM FOR HUMAN USE HAS ALREADY BEEN MAXIMIZED BY FORESTS AND FOOD PRODUCING PLANTS. WITHOUT ENERGY SUBSIDY THERE IS NO YIELD FROM THE SUN POSSIBLE BEYOND THE FAMILIAR YIELDS FROM FORESTRY AND AGRICULTURE.

Advocates of major new energies available from the sun don't understand that the concentrations quality of solar energy is very low, being only 10^{-16} kilocalories per cubic centimeter. Much of this has to be used up in upgrading to food quality. Plants build tiny microscopic semiconductor photon receptors that are the same in principle as the solar cells advocated at vastly greater expense by some solar advocates. The plants have already maximized use of sunlight, by which they support an ecosystem whose diverse work helps maximize this conversion as shown in Figure 5A. If man and his work are substituted for much of the ecosystem so that he and his farm animals do the recycling and

Figure 5. Diagrams of three systems of solar energy use.

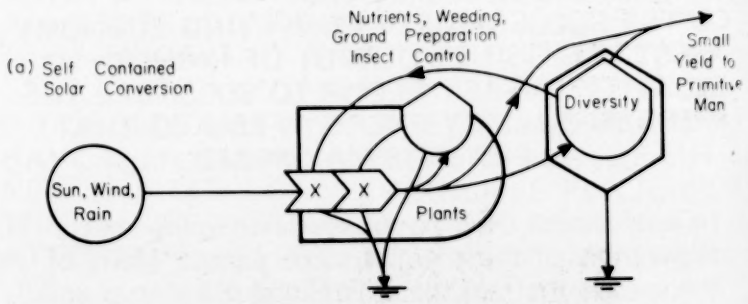


Figure 5 A. Man a minor part of the complex forest ecosystem.

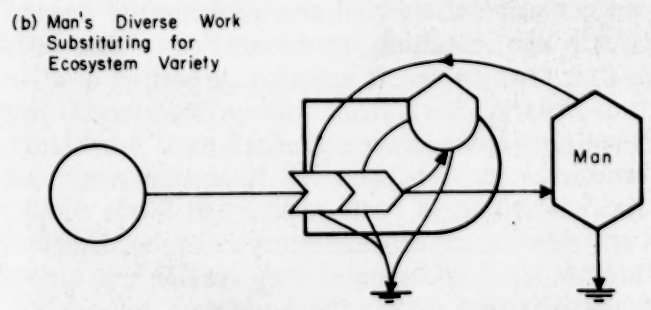


Figure 5 B. Man a major partner in an agricultural system on light alone.

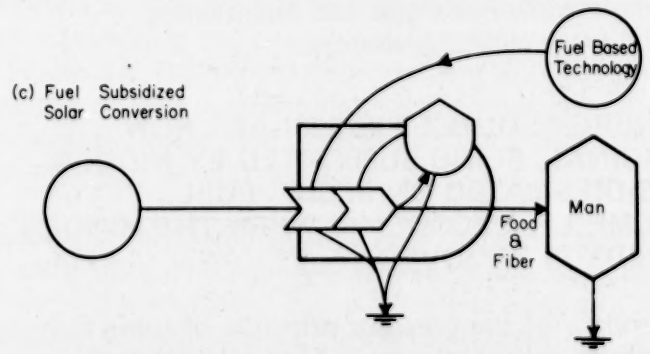


Figure 5 C. Fossil fuel subsidized agriculture as a colonial member of a technological society of man with maximum possible solar conversion.

management, higher yield results as in sacred cow agriculture (Figure 5B). Higher yields require large fossil fuel subsidies in doing some of the work. For example, making the solar receiving structures (Figure 5C), whereas the plants and ecosystem make their equipment out of the energy budget they process. Since man has already learned how to subsidize agriculture and forestry with fossil fuels when he has them, solar technology becomes a duplication. The reason major solar technology has not and will not be a major contributor of substitute for fossil fuels is that it will not compete without energy subsidy from the fossil fuel economy. Some energy savings are possible in house heating on a minor scale.

14. ENERGY IS MEASURED BY CALORIES, BTU'S, KILOWATT HOURS, AND OTHER INTRACONVERTIBLE UNITS, BUT ENERGY HAS A SCALE OF QUALITY WHICH IS NOT INDICATED BY THESE MEASURES. THE ABILITY TO DO WORK FOR MAN DEPENDS ON THE ENERGY QUALITY AND QUANTITY, AND THIS IS MEASUREABLE BY THE AMOUNT OF ENERGY OF A LOWER QUALITY GRADE REQUIRED TO DEVELOP THE HIGHER GRADE. THE SCALE OF ENERGY GOES FROM DILUTE SUNLIGHT UP TO PLANT MATTER TO COAL, FROM COAL TO OIL TO ELECTRICITY AND UP TO THE HIGH QUALITY EFFORTS OF COMPUTER AND HUMAN INFORMATION PROCESSING.

15. NUCLEAR ENERGY IS NOW MAINLY SUBSIDIZED WITH FOSSIL FUELS AND BARELY YIELDS NET ENERGY.

High costs of mining, processing fuels, developing costly plants, storing wastes, operating complex safety systems, and operating government agencies make present nuclear energy one of the marginal sources which add some energy now, while they are subsidized by a rich economy. A self-contained, isloated nuclear energy does not now exist. Since the present nuclear energy is marginal while it uses the cream of rich fuels accumulated during times of rich fossil fuel excess, and because the present rich reserves of nuclear fuel will last no longer than fossil fuels, there may not be a major long-range effect of present nuclear technology on economic survival. High energy cost of nuclear construction may be a factor accelerating the exhaustion of the richer fuels. Figure 4 illustrates the principle.
Breeder Process: The Breeder Process is now being given its first tests of economic effectiveness and we don't yet know how *net* yielding it will be. The present nuclear plants are using up the rich fuels that could support the breeder reactors if these turn out to be net yielders over and beyond the expected high energy costs in safety costs, occasional accidents, reprocessing plants, *etc.* Should we use the last of our rich fossil fuel wealth for the high research and development costs and high capital investments of processes too late to develop a net yield?
Fusion: The big question is will fusion be a major net yield? The feasibility of pilot plants with the fusion process is unknown. There is no knowledge yet as to the net energy in fusion or the amounts of energy subsidy fusion may require. Because of this uncertainty, we cannot be sure about the otherwise sure-leveling and decline in total energy flows that may soon be the pattern for our world.

16. SUBSTANTIAL ENERGY STORAGES ARE REQUIRED FOR STABILITY OF AN ECONOMY AGAINST FLUCTUATIONS OF ECONOMIES, OR OF NATURAL CAUSES, AND OF MILITARY THREATS.

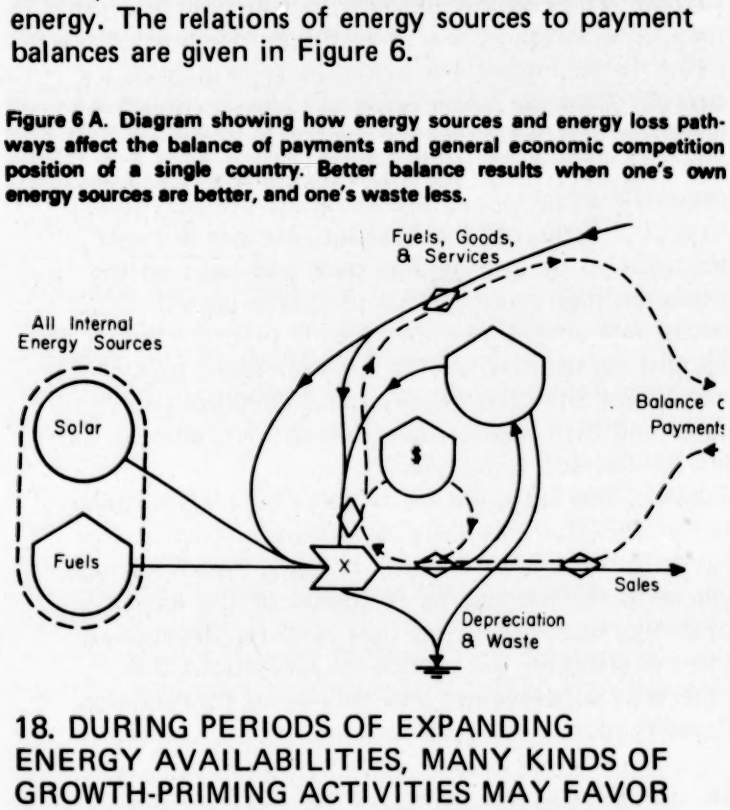
The frantic rush to use the last of the rich oils and gas that are easy to harvest for a little more growth and tourism is not the way to maintain power stability or political and military security for the world community of nations as a whole. World stability requires a de-energizing of capabilities of vast war, and an evenly distributed power base for regular defense establishments, which need to be evenly balanced without great power gradients that encourage change of military boundaries. A two-year storage is required for stability of a component.

17. THE TOTAL TENDENCY FOR NET FAVORABLE BALANCE OF PAYMENTS OF A COUNTRY RELATIVE TO OTHERS DEPENDS ON THE RELATIVE NET ENERGY OF THAT COUNTRY INCLUDING ITS NATURAL AND FUEL-BASED ENERGIES MINUS ITS WASTES AND NONPRODUCTIVE ENERGY USES.

Countries with their own rich energies can export goods and services with less requirement for money than those that have to use their money to buy their fuels. Those countries with inferior energy flows into useful work become subordinate energy dependents to other countries. A country that sells oil but does not use it within its boundaries to develop useful work is equally subordinate since

a major flow of necessary high quality energy in the form of technical goods and services is external in this case. The country with the strongest position is the one with a combination of internal sources of rich energies and internal sources of developed structure and information based on the energy. The relations of energy sources to payment balances are given in Figure 6.

Figure 6 A. Diagram showing how energy sources and energy loss pathways affect the balance of payments and general economic competition position of a single country. Better balance results when one's own energy sources are better, and one's waste less.



18. DURING PERIODS OF EXPANDING ENERGY AVAILABILITIES, MANY KINDS OF GROWTH-PRIMING ACTIVITIES MAY FAVOR ECONOMIC VITALITY AND THE ECONOMY'S ABILITY TO COMPETE. INSTITUTIONS, CUSTOMS, AND ECONOMIC POLICIES AID BY ACCELERATING ENERGY CONSUMPTION IN AN AUTOCATALYTIC WAY.

Many pump priming properties of fast growing economies have been naturally selected and remain in procedures of government and culture. Urban concentrations, high use of cars, economic subsidy to growth, oil depletion allowances, subsidies to population growth, advertising, high-rise building, *etc* are costly in energy for their operation and maintenance, but favor economic vitality as long as their role as pump primers is successful in increasing the flow of energy over and beyond their special cost. Intensely concentrated densities of power use have been economic in the past because their activities have accelerated the system's growth during a period when there were new energy sources to encompass.

19. DURING PERIODS WHEN EXPANSION OF ENERGY SOURCES IS NOT POSSIBLE, THEN THE MANY HIGH DENSITY AND GROWTH PROMOTING POLICIES AND STRUCTURES BECOME AN ENERGY LIABILITY BECAUSE THEIR HIGH ENERGY COST IS NO LONGER ACCELERATING ENERGY YIELD.

The pattern of urban concentration and the policies of economic growth simulation that were necessary and successful in energy growth competition periods are soon to shift. There will be a premium against the use of pump priming characteristics since there will be no more unpumped energy to prime. What did work before will no longer work and the opposite becomes the pattern that is economically successful. All this makes sense and is commonplace to those who study various kinds of ecosystems, but the economic advisors will be sorely pressed and lose some confidence until they learn about the steady state and its criteria for economic success. Countries with great costly investments in concentrated economic activity, excessive transportation customs, and subsidies to industrial expansion will have severe stresses. Even now the countries who have not gone so far in rapid successional growth are setting out to do so at the very time when their former more steady state culture is about to begin to become a more favored economic state comparatively.

20. SYSTEMS IN NATURE ARE KNOWN THAT SHIFT FROM FAST GROWTH TO STEADY STATE GRADUALLY WITH PROGRAMMATIC SUBSTITUTION, BUT OTHER INSTANCES ARE KNOWN IN WHICH THE SHIFT IS MARKED BY TOTAL CRASH AND DESTRUCTION OF THE GROWTH SYSTEM BEFORE THE EMERGENCE OF THE SUCCEEDING STEADY STATE REGIME.

Because energies and monies for research, development, and thinking are abundant only during growth and not during energy leveling or decline, there is a great danger that means for developing the steady state will not be ready when they are needed, which may be no more than 5 years away but probably more like 20 years. (If fusion energy is a large net energy yielder, there may be a later growth period when the intensity of human power development begins to affect and reduce the main life support systems of the oceans, atmospheres, and general biosphere.)

The humanitarian customs of the earth's countries now in regard to medical aid, famine, and epidemic are such that no country is allowed to develop major food and other critical energy shortage because the others rush in their reserves. This practice had insured that no country will starve in a major way until we all starve together when the reserves are no longer there.

Chronic disease was evolved with man as his regulator, being normally as a device for infant mortality and merciful old age death. It provided on the average an impersonal and accurate energy testing of body vitalities, adjusting the survival rate to the energy resources. Even in the modern period of high energy medical miracles, the energy for total medical care systems is a function of the total country's energies, and as energies per capita fall again so will the energy for medicine per capita, and the role of disease will again develop its larger role in the population regulation system. Chronic

disease at its best was and is a very energy-inexpensive regulator.

Epidemic disease is something else. Nature's systems normally use the principle of diversity to eliminate epidemics. *Vice versa,* epidemic disease is nature's device to eliminate monoculture, which may be inherently unstable. Man is presently allowed the special high yields of various monocultures including his own high density population, his paper source in pine trees, and his miracle rice only so long as he has special energies to protect these artificial ways and substitute them for disease which would restore the high diversity system, ultimately the more stable flow of energy.

The terrible possibility that is before us is that there will be the continued insistence on growth with our last energies by the economic advisors that don't understand, so that there are no reserves with which to make a change, to hold order, and to cushion a period when populations must drop. Disease reduction of man and of his plant production systems could be planetary and sudden if the ratio of population to food and medical systems is pushed to the maximum at a time of falling net energy. At some point the great gaunt towers of nuclear energy installations, oil drilling, and urban cluster will stand empty in the wind for lack of enough fuel technology to keep them running. A new cycle of

dinosaurs will have passed its way. Man will survive as he reprograms readily to that which the ecosystem needs of him so long as he does not forget who is serving who. What is done well for the ecosystem is good for man. However, the cultures that say only what is good for man is good for nature may pass and be forgotten like the rest.

There was a famous theory in paleoecology called orthogenesis which suggested that some of the great animals of the past were part of systems that were locked into evolutionary mechanisms by which the larger ones took over from smaller ones. The mechanisms then became so fixed that they carried the size trend beyond the point of survival, whereupon the species went extinct. Perhaps this is the main question of ecology, economics, and energy. Has the human system frozen its direction into an orthogenetic path toward cultural crash, or is the great creative activity of the current energy-rich world already sensing the need for change? Are alternatives already being tested by our youth so they will be ready for the gradual transition to a fine steady state that carries the best of our recent cultural evolution into new, more miniaturized, more dilute, and more delicate ways of man-nature?

In looking ahead, the United States and some other countries may be lucky to be forced by changing energy availabilities to examine themselves, level their growth, and change their culture towards the steady state early enough so as to be ready with some tested designs before the world as a whole is forced to this. A most fearful sight is the behavior of Germany and Japan who have little native energies and rush crazily into boom and bust economy on temporary and borrowed pipelines and tankers, throwing out what was stable and safe to become rich for a short period; monkey see, monkey do. Consider also Sweden that once before boomed and busted in its age of Baltic Ships while cutting its virgin timber. Later it was completely stable on water power and agriculture, but now after a few years of growth became like the rest, another bunch of engines on another set of oil flows, a culture that may not be long for this world.

What is the general answer? Eject economic expansionism, stop growth, use available energies for cultural conversion to steady state, seek out the condition now that will come anyway, but by our service be our biosphere's handmaiden anew.

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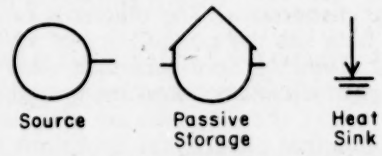
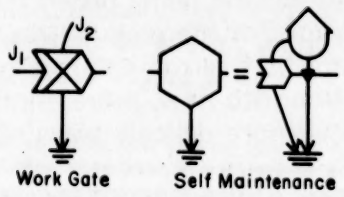
References and Notes:

1. H T Odum, *Environment Power and Society* (John Wiley) 336pp.
2. D H Meadows, D L Meadows, J Randy and W W Behrens Behrens III, *The Limits to Growth* (Universe Books, New York, 1972).
3. A J Lotka, *Contribution to the energetics of evolution* in Proceedings of the National Academy of Sciences 8, 147-188 (1922).
4. I am grateful for stimulation and collaboration of many in our common effort including especially C Kylstra, Pong Lem, and our keen graduate student group in the United States, and Jan Zeilon and Bengt-Owe Jansson in Sweden. Simulation work was supported by the U S Atomic Energy Commission on Contract At-(40-10-4398).
5. Energy systems symbols used for showing mathematical and energetic relationships between the parts of our system of energy, enonomics and ecology.



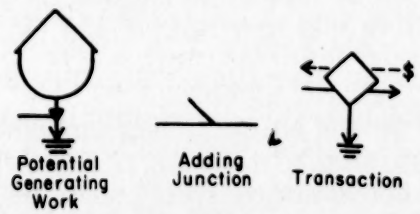
All outside energy sources flow in from sources indicated with the circular symbol and these sources deliver causal forcing actions. All storages of energy.

structure, money, information, value, *etc* are represented by the tank shaped symbol and these tanks are called state variables. All energies leave systems as dispersed heat that has no more potential for doing useful work. In the diagrams the dispersal of unusable heat energy is called a heat sink.



When two different kinds of flows of energy (or materials, information, or services that carry energy) interact in processes where both are necessary, we draw a work gate symbol. The system has an X if the action of one flow so facilitates the flow of the other and vice versa so that the process is a multiplier action. As in all processes, useful energy that drives the processes emerges as degraded, no longer reusable dispersed energy leaving the earth through the heat sink. (Heat on earth ultimately is reradiated out to space from the top of the atmosphere.)

Self maintaining entities such as populations, cities, industries, and other organizations that feed energy from storage back into multiplicative pumping actions are shown with the hexagonal symbol. The energy dispersed in maintaining the system, its growth, and its work services is shown passing out the bottom in a heat sink.



When new storages are developed, energy laws require that much of the energy be dispersed into unusable heat in order to make the process of storing go fast enough to be most competitive. The symbol for potential generating work shows the necessary heat dispersal that is required for any storing process.

When two energy flows may be substituted for each other, we show their junction as the convergence of lines. This means that the flows add (in contrast to the work gate where other kinds of interactions are the result).

Because money flows as a countercurrent to the flow of energy, goods, and services (the latter two also carrying energy), we represent pathways that involve economic transactions with the diamond shape symbol and two counter diagrams pathways. The energy cost of doing economic business is shown as the energy lost into the heat sink.

The diagrams may be examined as if they were a series of water tanks and pipes with water flowing between the tanks, being driven by the pressures of the storages or outside pressures and the energy of the water pressure ultimately leaving the system in the various frictional heat dispersions. The diagrams can thus be visualized to help see the complexity of systems and recognize just from the configurations what kinds of responses might follow proposed manipulations. As further given in (1) the diagrams are also ways of writing mathematical differential equations for making precise mathematical descriptions of relationships.

Notes for Press Conference January 14, 1974

MORE PERSPECTIVES ON WORLD ENERGY RELATIONSHIPS

Howard T. Odum
Environmental Engineering Sciences
and
Center for Wetlands

Twenty points about the current world energy situation are made in this article using simple models to show some fallacies in many proposed responses to energy needs. Additional points follow:

1. U.S. POLICY RELATIVE TO OTHER COUNTRIES IS DANGEROUS TO ITS SURVIVAL AS AN INDEPENDENT ENTITY.

The countries that hold back their richer fuel reserves while others are spending their last reserves end up with more relative power in military and economic affairs. The recent actions to use our reserves of fuel and other energy costing and amplifying strategic reserves for business as usual is bordering on treasonous and yet was adopted by an ignorant Congress.

Rich energies get more energies if they are used in amplifier actions (example: machinery for using other resources). As rich fuels get scarce they become more and more limiting in such activities and their energy amplifier effect gets larger. Thus, the countries that save energy until later get more energy out of secondary amplifier actions. One should not spend our reserves now.

Fuels don't actually run out except where price fixing is attempted, since holding prices down causes oils to go elsewhere for sale. Money costs rise as energy cost of getting energy rises since a higher percentage of the human economy gets involved in energy getting. The long range energy effect is the diversion of many current aspects of our so called standard of living back to energy collection and concentration work.

Those that advocate use of current remaining reserves in order to be internationally independent are thinking backwards. In the first place, if one uses up one's own reserves rather than those available to economic and military competitors one makes his last situation worse. If you go far enough at this, you will ultimately become a colony invaded either economically or militarily. To maintain independence, keep reserves as a storage to help control prices and prevent attack and use up everyone elses fuels first, even if one

has to pay more and take a temporary cut in living standard. In the second place, using one's own oil reserves causes one to get to low grade oils spending more and more of one's economy on getting energy, lowering one's balance of payments and standard of living anyway.

2. PRESENT U.S. POLICY HAS SOME WAR RISKS.

Large war may be prevented if all potential combatants have a realistic understanding of their energy condition so that they will truly know what the outcome would be if a war was conducted at a particular boundary, considering its distance from respective power centers.

If the boundary between two competing power centers is located appropriate to the energy sources available to the defense, and both sides understand their strength, then large war may be prevented. If, however, there are shifts in relative energy and the boundary is not shifted, a situation is set up where the system with lesser energy can be defeated and driven well back from its former position. The U.S. is now in that role relative to its position in the 1940's since it has 1/3 or less of the world's energy expenditure whereas it used to have half.

There is a great danger that the U.S. might attempt to exert military action in the eastern Mediterranean as it once did in Eisenhower times with inadequate power to do it as compared to Russian and other energy proximity and greater energy resources. If the U.S. is induced into wars that it hardly has the energy to support while other nations with oil reserves do not become so much involved, the relative energy position of the U.S. will deteriorate and it becomes so energetically weak that it could not handle its own hemispheric defense. For world stability energy differentials need to be evened out and the richer sources used first so that balance of energy resources is maintained.

As oil producing countries and associates get full industrial technology which they can readily buy as their relative richness so exceeds that of existing technological countries, their total military and economic power will grow into a new colossus. If there is a large difference in actual energy cost of getting energy between the U.S. and the producers of richer oils, the latter can determine which countries will have economic edge by sale at slightly lower prices. There is no way the U.S. can organize the non oil producers into a counter power with inferior energy sources. There might be enough storage of high energy capability in the industrial countries to try for an oil conquest if they were quick about it, but they are probably blocked by the greater soviet energy and equivalent power at that distance. It would probably mean World War III. The U.S. alone could not do it. The European countries can get their needs by joining the Arab block.

3. ENERGY COST OF SOME ACTIVITY MUST INCLUDE ALL ITS INPUTS.

A bad error is being made in much public forum discussion and in many economics papers that attempt to determine the energy use of a given process. The error arises in calculating the energy use of an activity as only that directly observed to be used by the activity, while ignoring the energy that makes possible all the other goods and services that go into that activity. For example, the energy utilization in transportation is not just the fuels used by the cars, but is also the energy spent all through the economy subsidizing the making of the cars, the roads, and the maintenance. One way of estimating the energy spent in support of such a complicated activity is to obtain the money cost and convert to the average energy expenditure per dollar as calculated from the total economy such as a figure of 17,000 kilocalories to the dollar.

4. LET'S FACE DECLINE IN TOURISM AND NOT SWEEP IT UNDER THE RUG.

If we may judge by the increase in tourism that followed the increased energy subsidy of our culture, tourism is a property that depends on high energies. As net energies go down in the U.S. so must tourism. Political attempts to keep its priority over endeavors such as getting more food and fuel energies will fail (unless there is some rich source of excess energy culture to draw tourists from). Whereas efforts to make transitions slow and non-disruptive are needed, no one is doing anyone a favor by implying that tourism will not be declining. Florida must plan for a change. One temporary step to help during an interim is to set up an air line shuttle from green lush Florida for African and Arab tourists to spend their new excess monies.

5. HUMANS OF ALL AGES WILL BE NEEDED MORE.

As energies for machines decline, many functions may take more human labor instead for the simple development of food and fiber. Thus, the young and the old will be more needed in the work force. Ultimately, displacement unemployment will be temporary as machines are replaced by people. The rising energy cost of energy will so inflate the value of money that the pension plans and other savings will be depreciated so that the amount of money that retirees can bring to Florida will decline so that they will be less an income source. We need to help them find a low energy life style without becoming a public drain.

6. TEMPORARY HIGH PROFITS SHOW UP DURING ENERGY DECLINE.

During the decline in money value, those with businesses can be misled about their future by temporary prosperity, since goods and storages

done under one energy level will be sold as the price goes up; but increased money profits will be more than undermined by the inflation. The public will think the temporary profit is a conspiracy.

7. THE FOLLOWING MAY BE INDUSTRIES THAT WILL DROP OUT, AND WHICH WE SHOULD ENCOURAGE TO RECOGNIZE THEIR NEED TO DIVERSITY AND TRANSFER THEIR SKILLS TO OTHER ACTIVITY.

A. Urbanization construction will be replaced for smaller projects, most of which will be replacements.

B. Artificial vegetation will be replaced by more use of self maintaining vegetation (natural). Thus, work will decline that concerns lawns, plant nurseries, tree surgeons, manicuring parks and rights of way, golf courses, astroturfs.

C. Air conditioning will be replaced by architecture that fits human settlement into trees and microclimates of moist vegetation shade, uses winds, etc.

D. Eutrophication problems will decline as farmers bid for sewage use; ecological engineering will replace some other kinds of environmental engineering. Lowered energies will take the pressure off the environment in many situations.

E. Universities will be less occupied and will need to organize among themselves to keep society from losing valuable information accumulated during our recent energy rich periods. Creative activity will be less and knowledge custodial service may be more. Computer use will be less.

F. Farms may use more land but their functions and cycles will be more intact and their external environmental action less.

G. Tourism will be less and operating with energy attractions, using less artificial lures and a higher percentage of self maintaining natural ones.

H. The scale of activities may be reduced and decentralized with more small units replacing large unified ones. This may apply to cities sewage handling, cars, and even utilities. Agriculture will develop more local use and variety.

I. Religions concerned with adaptation and satisfaction with an uneven continued pattern will increase and religious unrest will decrease. Mental health should improve once the shock of change from growth to more level economy is passed.

J. Advertising and communications will be reduced.

K. Properties of high energy concentration will decrease: crime, wrecks, police, noise, central services and their tax costs.

L. Pine plantations for paper may decrease in favor of food production and forest management for lumber for buildings.

M. Exotic medical services will decline.

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The American Standard of Living

"The goal of a happy, high-consumption world cannot be fulfilled even for the 3.5 billion people now alive, much less for the 6 billion expected by the year 2000. At the American standard of living the earth could support only 500 million people."

— Sir Peter Medewar, 1970

Sent by Eleanor McCallie from "Simple Living Project", American Friends Service Committee.

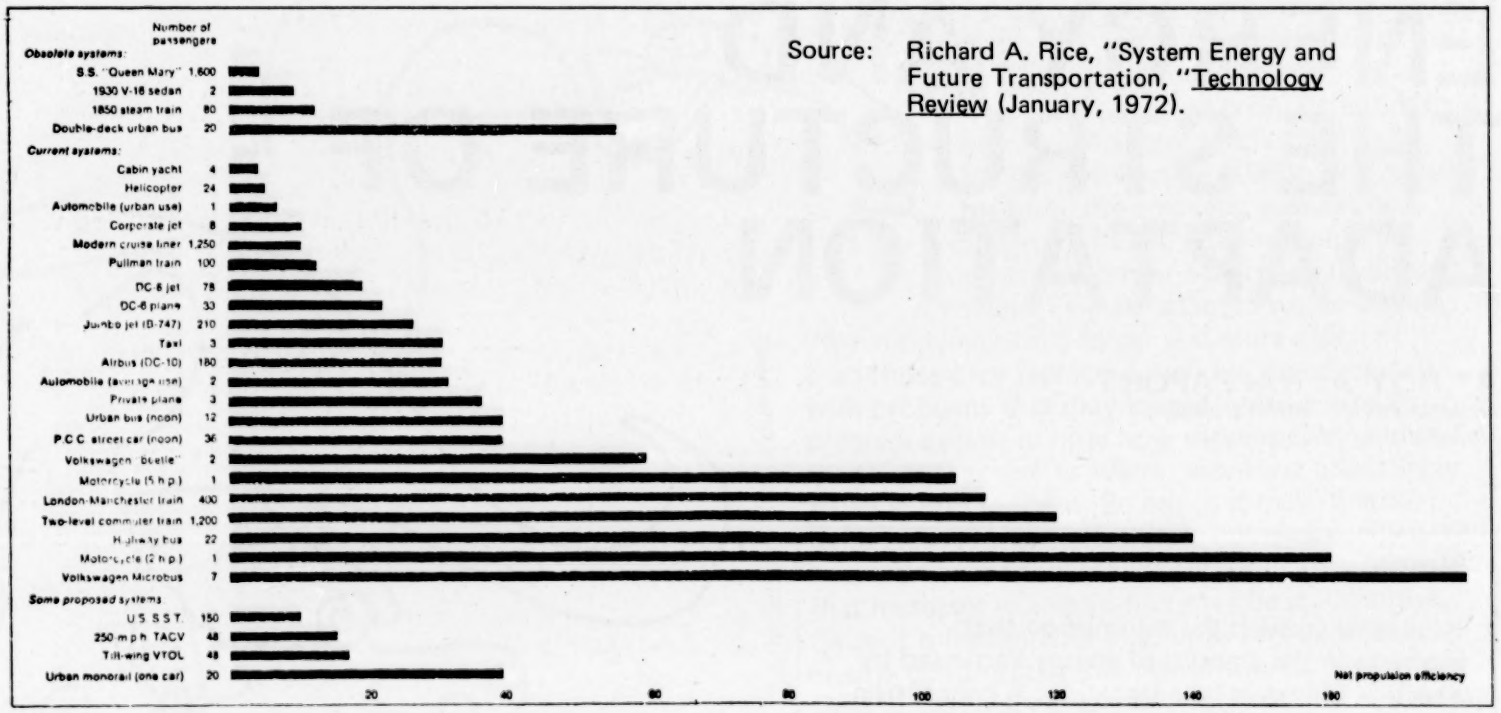
"In the United States in 1970 the per capita consumption of primary energy in terms of kilograms of coal equivalent was roughly 11,100. In the Soviet Union it was roughly 4,000. In Japan roughly 3,500. In the People's Republic of China it was roughly 500. And the lowest country on the scale, the lowest consumer of primary energy, happened to be Berundi in 1970, with a per capita consumption of nine. So that the average citizen of Berundi, if he carried nine kilos of coal on his back, would be carrying his annual supply of primary energy. Now this is the reality of the world in which we live. And this is what we're talking about when we talk about differentials in the combinations of population, technology and resources. And once one begins to look at the world in this way, it never looks the same again. It just never looks the same again! Everywhere you turn you see it this way."

Dr. Robert North, 1973

Does energy shortage lead to food shortage? Where? Does the U.S. really expend 20 calories of fossil fuel for one calorie of food, and does China reverse that ratio?

Not all the answers, but a good many, are in "Comparative Efficiency of Energy Use in Crop Production" by Gary Heischel, available from: Connecticut Agricultural Experiment Station, New Haven, Ct 06504. Suggested by Paul Ehrlich.

—SB



Source: Richard A. Rice, "System Energy and Future Transportation, "Technology Review (January, 1972).

Travel Efficiency

All of the principal system alternatives for passenger transportation for which data are readily available are compared in this chart in terms of their net propulsion efficiency, the number of passenger-miles moved per gallon of fuel. Note that the number of passengers on which the efficiency is calculated is not necessarily a maximum capacity but is instead an average figure for present experience. Efficiency rises dramatically as more passengers are accommodated; with three occupants a Volkswagen "beetle" comes out with a net propulsion efficiency of 100.

(From "The Potential for Energy Conservation", $3 from: Supt. of Documents, Washington DC 20402.)

The Basic Energy Unit

Dear Stewart:

Confirming our discussion on energy problems, I believe we need to establish a concept of power rationing based on a family unit of energy consumption.

The idea originates from Henry George's land tax theory (no tax on a family farm unit, but as units of land control beyond the unit held by an individual or company increase, so would taxes. As I recall, George argued for this to ultimately protect the democratic processes by guarding the independent strength of the grass roots landowner from the historical tradition of large owner control, etc.

Ahead of his time, he was little rewarded. I attribute the failure of his idea to the then seemingly unlimited supply of land. Recent public awakenings to finite resource realities may yet popularize it. Ideas like that endure, and he may yet have his innings.

Back to power units. On some scale the U.S. is going to have to adjust (or ration) energy consumption. Our 6% of the population consuming 30% of the energy each year is beginning to bind. We have educated enough third world leaders now who want to manufacture their own tin cans and pizzas. That U.S. percentage may have to level out a bit. So policy makers should have in hand a proposed model of energy rationing. This, if taken to its end, should be done on a world scale by the U.N. However, hometown U.S. stuff needs quicker action than that route. At present, anything of scale here is difficult. Government, for instance, has just been jolted by the implications of the oil industry's keeping the nation's petroleum records.

So as a start I would like to see a basic family unit of energy based on past, present and some projected use. Ideally this could mean total ergs, or whatever; a total picture of petroleum, forest products, etc. Again, it may be too complex for now. But if we just use one common source, electricity, we might come up with a figure.

Once we have that, say 100 kilowatt hours a week or whatever, it can be argued that a basic unit could be made available. It might be available at a low cost of $1, or even free. $1 or $100, anyway one unit. Further equal amounts would cost multiples. The first basic amount of energy costs x. Then the second amount cost 4x. The third 8x, or whatever. The consumer who could afford it might want a second unit too, or a third and fourth, etc. However, the super consumer who used more would pay for it at a compound rate to help defray the low cost of the family unit. His second unit would cost more than twice, say $3; the third $9, etc.

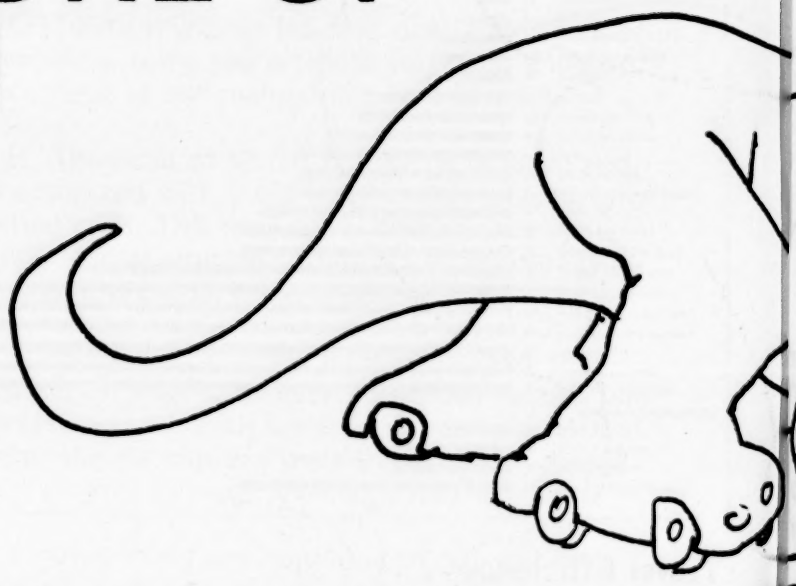
That way the market would help allocate a resource which, if successful, could be applied to other resources as well.

Any ideas?

Sincerely,

Huey D. Johnson
President
Trust for Public Land
82 2d St
San Francisco 94105

ENERGY AND THE STRUCTURE OF ADAPTATION



BY ROY A. RAPPAPORT
Department of Anthropology
University of Michigan

Abstract

Issue is taken with the assumption that increases in the amount of energy harnessed by a society improves its adaptation. A conception of adaptation subsuming both reversible "functional" or "systemic" changes is advocated, and the cybernetic and hierarchical structure that it implies is outlined. In light of this discussion in a conception of maladaptation as structural anomaly is proposed, and a number of ways in which increases in energy flux may encourage the development of such anomalies is suggested.

Scientific American carried a tidy resume of Roy Rappaport's work with his article "The Flow of Energy in an Agricultural Society" in their special Energy issue, September 1971.

> Roy A. Rappaport ("The Flow of Energy in an Agricultural Society") is associate professor of anthropology at the University of Michigan. He did not take up anthropology professionally until 10 years after being graduated from Cornell University with a degree in hotel administration. During those years he owned an inn in Lenox, Mass. "In 1959," he writes, "I left the resort business to enter graduate studies in anthropology at Columbia University, receiving a Ph.D. from that institution in 1966 after doing archaeological fieldwork in the Society Islands and ethnographic fieldwork in New Guinea." His main interests are the ecology of nonindustrial people and religion, and particularly the relation between ecology and religion, which he examined in the book **Pigs for the Ancestors: Ritual in the Ecology of a New Guinea People.**

Jim Harding first told me of Rappaport's cybernetic anthropology and sent along a copy of "Sanctity and Adaptation", which we'll reprint in the Summer CQ. That paper contains a statement which I'm coming to regard as Rappaport's Law:

> Knowledge will never replace respect in Man's dealings with ecological systems.

Jim also mentioned that Rappaport was working on a book on "Maladaptation", which incited me to write to Rappaport at his sabbatical address in England. In reply he sent an early draft of material for the book he was putting together (with an emphasis on energy) for the American Association for the Advancement of Science meeting in San Francisco.

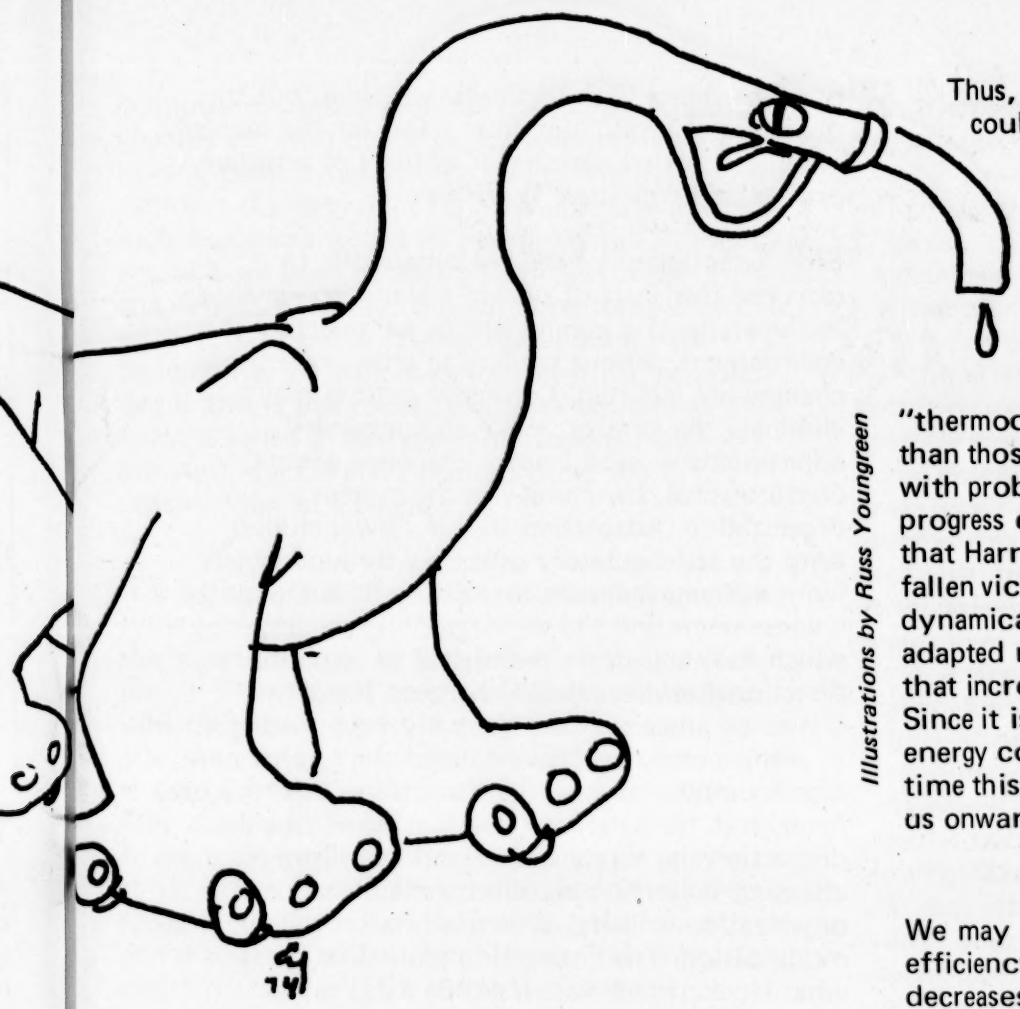
—SB

Human societies, and the groups and organisms composing them are, among other things, thermodynamic systems, and social scientists have long been concerned with the matter-energy relationships among their parts, among them as wholes and between them and their environments. Consideration of energy relations has been particularly influential in the conceptualization of cultural evolution. Over a quarter of a century ago Leslie White, following the earlier lead of Ostwald (1907) proclaimed what he asserted to be "the basic law of cultural evolution" as follows:

> "Other factors remaining constant, culture evolves as the amount of energy harnessed per capita per year is increased, or as the efficiency of the instrumental means of putting energy to work is increased (1949: 368-369)."

This formulation does accord in a general way with mankind's experience. Large, technologically developed states appearing late in history surely do harness more energy per capita per day or year than do small "primitive" societies which appeared earlier. One recent estimate would place daily energy consumption in contemporary United States at 230,000 kilocalories, and in hunting and gathering societies at two to three thousand kilocalories (Cook 1971:83).

But there are some difficulties. White was fully aware that the evolution of culture, impelled by



Illustrations by Russ Youngreen

ever more powerful technology does not necessarily enhance the well-being of the culture bearers. He notes the increasing possibilities for oppression that have emerged with increases in the ability of mankind to harness energy and, writing shortly after the explosion of the first atom bombs he observes:

> "....technology...may turn out to be a villain instead of a hero. Technology builds but it may also destroy. The belief and faith that civilization won at such great cost in pain and labor simply cannot go down in destruction because such an end would be too monstrous and senseless, is but a naive and anthropocentric whimper (1949:391).

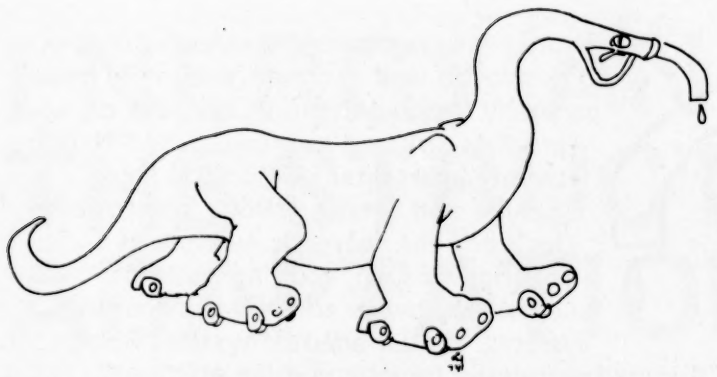
Nevertheless, White concluded his discussion on an optimistic note. He saw destruction to be no more inevitable than salvation, and believed that the denoument toward which "our mighty technology" is rapidly leading us is a single, planet-embracing political system in which peace will prevail and in which private advantage will finally be subordinated to the common good. His optimism and his general attitude toward the course cultural evolution has taken is clearly indicated in the last sentence of his essay. Speaking of his own discipline he said,

> "The science of culture is young but full of promise. It is destined to do great things– if only the subject of its study will continue its age old course: onward and upward (1949:393).

Thus, while White recognized that technology could destroy as well as create, and while he generally avoided the term, the idea of progress did tend to creep in, and Harris, twenty years later (1968:653) took Sahlins and Service (1960: 12f) to task for using the energetic measure as a criterion of such, and "not only of successively better adapted sociocultural systems," better adapted systems being "thermodynamically larger and more efficient" than those they replace. I shall not be concerned with problems that may inhere in the notion of progress except to note how slippery they are, and that Harris, as well as White, may have unwittingly fallen victim to them. Be this as it may, thermodynamically larger systems are not necessarily better adapted nor more adaptive. Indeed, I shall argue that increases in energy flux may be maladaptive. Since it is indubitable that, until very recently energy consumption has been rising for a very long time this is to say that evolution may not be leading us onward and upward, but toward disaster.

We may dispose of the matter of thermodynamic efficiency quickly. First, high energy technology decreases the thermodynamic efficiency of human subsistence activities. Hannon (1973) has recently estimated the slash and burn horticulture of the Maring of New Guinea, in which the only sources of energy are the gardeners themselves, to be forty times as efficient as "modern food delivery systems." Whereas he estimates that the Maring produce ten units of food energy for every unit of energy input (my own estimate is closer to 20:1 Rappaport: 1968), he claims, following Herendeen (1973) that in modern agriculture and food processing 45 units of fossil fuel is used to deliver 10 units to the supermarket. Heichel (1973) has observed that in the more efficient modern systems such as maize cultivation, the return of food energy for energy input approaches 5:1, but in the less efficient systems like rice, sugarbeet and peanut cultivation, it sometimes is less than 1:1, and he further notes that in a "surprising number of modern cropping systems a 10 to 50 fold increase in cultural energy has only doubled or tripled the digestible energy yield compared with the more primitive systems using substantially less technology (p. 18f)."

A more general index of the decreasing thermodynamic efficiency of contemporary industrial societies is implicit in the first part of "White's Law" itself. If a figure already cited is correct, South African bushmen and Australian aborigines are able to support a person on 1/75 to 1/100 of what it takes to support an American. That is, from the standpoint of the ratio of energy flux per unit of standing biomass, hunters and gatherers are 75 to 100 times more efficient than we are. Or, to put it a little differently, we are, on a per capita basis, entropizing the world 75 to 100 times



faster than are they. We note in passing, an inconsistency between the two criteria of "White's Law."

It may be objected, of course, that the use of ever increasing amounts of fossil and hydroelectric energy has increased the efficiency of the ratio of biological energy input to food energy return, and this is undoubtedly true. But fossil energy is not without its costs, and neither is hydro-electric power. More important, the vulnerability of systems to perturbation probably increases proportionately to their increased reliance upon such energy sources. Indeed, a kind of Catch-22 corollary to "White's Law" may be proposed: other things being equal, the further away from stable equilibrium (entropy) that dynamic equilibrium is held, the more liable is the system to disruption and the more serious disruption is likely to be. It is not merely that increasing reliance upon non-biological energy increases vulnerability due to failures of the energy supply. The increased energy flux itself may contribute positively to maladaptive trends in ways to be suggested here.

Before approaching maladaptation and its relationship to energy I must make clear what I mean by adaptation. I take this term to refer to the processes by which living systems maintain homeostasis in the fact of both short term environmental fluctuations and, by transforming their own structures, through long term non-reversing changes in the composition and structure of their environments as well. Several comments or elaborations are in order. First, I take living systems to include organisms, single species assemblages of organisms such as populations, troops, herds, tribes and states, and multi-species assemblages of organisms, i.e., ecosystemic communities. Second, homeostasis may be given specific, if not always precise meaning if it is conceived as a set of goal ranges on a corresponding set of variables abstracted from what, for independantly established empirical or theoretical reasons are taken to be vital or indispensible conditions for the survival of the system under consideration. This is to say, that any process, physiological, behavioral, cultural, or genetic which tends to keep crucial variables within their ranges of viability or tends to return them to such ranges should they depart from them may be taken other things equally to be adaptive. Later it will be necessary to consider difficulties in the association of adaptiveness with particular variables, but this preliminary formulation may stand for the present, because it underlines certain features of adaptive process and structure. These are:

First, adaptation is basically cybernetic. In response to signals of system endangering changes in the states of a component or an aspect of the environment, actions tending to ameliorate those changes are initiated. Corrective actions may eliminate the stressor, make compensatory adjustments or even involve changes– genetic, constitutional, structural– in the system's organization. Adaptation in this view includes both the self-regulatory processes through which living systems maintain themselves in fluctuating environments and the self-organizing processes by which they transform themselves in response to directional environmental changes. These two classes of processes have generally been distinguished in anthropology and have formed the foci of two distinct modes of analysis: "functional" on the one hand, and "evolutionary" on the other. But the distinction has surely been overdrawn. In a changing universe, after all, the maintenance of organization is likely to demand its continual modification. The connecting generalization is what Hockett and Ascher (1964:137) called "Romer's Rule" after the zoologist who first enunciated it in a discussion of the emergence of the amphibia (Romer: 1954). The lobe finned finned fish, he argued, did not come onto dry land to take advantage of the terrestrial habitat. Rather, relatively minor modification of their fins and other subsystems make them better able to migrate from one drying up body of water to another still containing water during a period of intermittent dessication. These changes made it possible for these creatures to maintain their general aquatic organization during a period of marked environmental change. In slightly different terms, self-organizing or evolutionary changes in components of systems are functions of the self-regulatory processes of more inclusive systems. Thus, structural or evolutionary changes, such as fin to leg, although on some grounds they may be distinguished from "functional" changes or "systemic adjustments" are not separated from them in the larger more inclusive scheme of adaptive process. Together they form order series of responses to perturbations.

These sequences have certain important properties (Bateson 1963, Slobodkin 1968) that can only be briefly noted here. The responses most quickly mobilized are likely to be energetically expensive, but they have the advantage of being easily reversible should the stress cease, but they can hold the line, so to speak, until relieved by slower acting, less energetically expensive, less easily reversible changes should it not cease. Thus, responses to high altitudes start with panting and racing of the heart, which are immediate, and

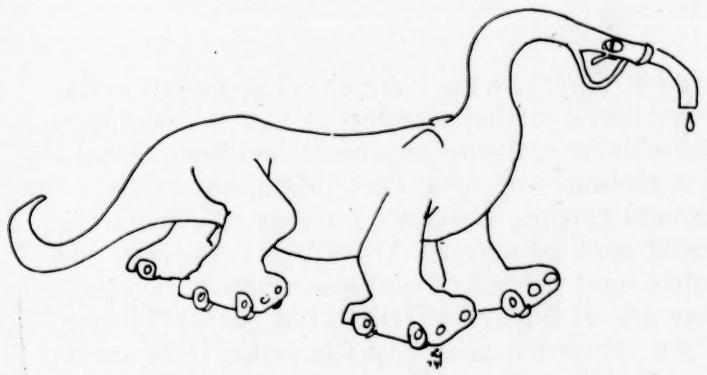
continue through a series of circulatory and other changes to, after a year or so, irreversible changes in lung capacity and in the size of the heart's right ventricle (Frisancho 1972). The ultimate change in such sequences would be genetic, although this seems not to have been necessary in high altitude adaptation. Similarly, the initial response of a town to very heavy traffic loads during peak periods may be transitory redeployment of police. But is this is inadequate or causes an intolerable strain a series of less reversible actions may be initiated, the ultimate perhaps being the construction of a by-pass.

It is of note that the earlier responses deprive the system of behavioral flexibility while they continue— the organism when it first moves to 15,000 feet can do little except aerate itself; the police force, while it is taking care of peak traffic is not free to attend to emergencies. But while they continue, the structure of the system remains unchanged; thus they conserve the long run flexibility of the system. In contrast, while the later responses do alleviate the strain of the earlier, they are likely to reduce long range flexibility. There is in such series a continual and graduated trade-off of adaptive flexibility for adapted efficiency. To the extent that the perturbations to which the system will be subjected in the future are unpredictable it is good evolutionary strategy to give up as little long range flexibility as possible, and evolutionary wisdom seems to be intrinsic to the graduated structure of adaptive response sequences, at least in biological systems. As we shall see later, social systems can make mistakes of which biological systems may be incapable, and that these "mistakes" are encouraged by high energy technology.

A second general point, related to the first, is that adaptive processes are not only cybernetic and graduated. The adaptive structure of any living system is not merely a collection of more or less distinct feedback loops. Special adaptations must be related to each other in structured ways and general adaptations, human or otherwise, biological or cultural, must take the form of enormously complex sets of interlocking corrective loops, hierarchically arranged and including not only mechanisms regulating material variables, but regulators regulating relations between regulators and so on (Kalmus 1966, Miller 1965a, 1965b, Pattee 1973, Powers, Clarke and McFarland 1966, Rappaport 1971, Simon 1969), whether or not they are embodied in particular organs or institutions are found in all biological and social systems. To say that regulatory structure is hierarchical is not to say that it is centralized, nor does it imply social stratification. Among some egalitarian societies, components of regulatory hierarchies are imbedded in ritual cycles; in others in segmentary kinship organization (Brookfield and Brown 1963, Ford 1971, Meggitt 1965, 1972, Ortiz 1970, Rappaport 1968, Sahlins 1961).

Another aspect of the hierarchical organization of adaptation is the relationship of parts to wholes. Whole living systems— organisms and assemblages of organisms— are what Pask (1968) has called "general purpose systems", for they do not have special goals or outputs. Their only purpose or goal is that most general of purposes or goals, survival. They are, as Slobodkin (1968) has put it, "players of the existential game", one in which there are no pay-offs external to the game because the player can't leave the table, and in which, therefore, the only reward for successful play is to be allowed to continue playing. But they are made up of subsystems which do have special goals or outputs valuable, presumably, to the larger systems of which they are parts. The increasing differentiation, in the course of evolution, of special purpose subsystems in organisms, societies and ecosystems has been called "progressive segregation" (Hall and Fagen 1956, Van Bertalanffy 1969), and it is often accompanied in organisms and social systems, but not ecosystems, by increasing centralization of regulatory operation, or "progressive centralization." In organisms we note the elaboration of central nervous systems; in societies the development of administrative structure. This contrast between the development of ecological and other systems may rest upon their contrasting bases for order maintenance. The basis of orderliness in ecosystems seems to shift in the course of successions from a reliance upon the resilience of individual organisms to a reliance upon the increasing redundancy of matter and energy pathways resulting from increasing species diversity, and not to central regulation. These contrasting bases of order maintenance, in turn, reflect differences in the degrees of coherence that different classes of systems require and can tolerate. By "coherence" I refer to the extent to which a change in one system component affects changes in others; in a fully coherent system any change results in immediate and proportional changes in all components (Hall and Fagen 1956). As no living system can be totally incoherent neither could it be totally coherent, for in a fully coherent system disruptions anywhere would immediately spread everywhere.

Organisms are, and in their nature must be, more coherent than social systems, and social systems are more coherent than ecosystems. As a rule of thumb, the more inclusive the system and the greater the degree of relative autonomy of its subsystems the less coherent it must be. The less inclusive the system the more its internal orderliness and the effectiveness of its activities depends upon the fine coordination of its parts. An organism requires and can tolerate closer coordination of the activities of its parts than societies and societies more, at least from time to time, than ecosystems. Coordination depends upon centralization, hence progressive centralization in organisms and societies, but not ecosystems.



Whereas the adaptive structures of all living systems have certain fundamental features in common they also differ in certain ways, probably related most importantly to differences in their coherence and in the relative autonomy of their subsystems. I shall now make explicit what I think may be some of the salient features of orderly adaptive structure in social systems as a preliminary to noting the ways in which high energy technology may disrupt it. For the sake of brevity the suggestions that follow will be expressed less tentatively than I would like. Empirical research and further conceptualization is badly needed; what follows is to be taken to be suggestive. I shall follow the convention of referring to more inclusive systems and regulation as "high order", less inclusive as "lower order." Certain of these features have already been implied.

1. Lower order regulation is concerned with specific operations in special purpose subsystems in accordance with goals or considerations established from "above" either by directive, or some such mechanism as "demand" in a market economy. Among higher order directives may be included not only some for changing the programs of subordinate subsystems, but for replacing entire subsystems with others. Higher order regulation has more general concerns, and higher order directives may be less specific than those of lower order. Whereas those of lower order may be confined to detailed commands, those of higher order may include rules, laws and yet less specific statements of principle or policy.

2. The response times of lower order regulators are generally faster than those of higher order.

3. Lower order responses are more easily reversible than those of higher order. Moreover, being closer to the perturbations and being in a position to issue highly specific commands immediately related to perturbations and changes in them, low level regulation is likely to be more delicate than higher order.

4. The discourse surrounding higher order regulation is likely to be more value laden, compelling and sacred than that of lower order, even, or even especially, in modern societies. The discourse of economics, involving as it does value laden terms like "free enterprise" is more value laden than that of one of its subsystems, say, agriculture, and the state as a whole is "One nation under God."

5. Adaptive structure in human societies is not usually fully incorporated in formal organization. Although formal organization may play a major part in the adaptive responses of most societies most of the time adaptive response is not restricted to the activities of formal organization. It also may include grass roots movements, cults, ad hoc organizations and so on. These may lead to, or themselves constitute structural change. There is a dialection, so to speak, between formal organization and "spontaneous" adaptive responses.

We now turn to maladaptation and the ways in which increases in energy encourages it. If adaptive processes are those which tend to maintain homeostasis in the face of perturbations mal-adaptations are factors internal to systems interfering with their homeostatic responses. (For a similar conception of disease see Young and Rowley 1967). If the maintenance of homeostasis depends upon hierarchically ordered sequences of cybernetic responses maladaptations may be described in terms of hierarchical and cybernetic structure. Following this, the most simple forms of maladaptation are such cybernetic difficulties as impedance to the detection of deviation of variables from crucial ranges, excessive delay of information concerning variable states to system regulators and loss or distortion of information in transit. These and other difficulties to which we shall attend are exacerbated by scale. For instance, the more nodes through which it must pass, the more subject is information to distortion or loss. Other things equal, the higher the administrator the less accurate and adequate his information is likely to be, and thus the more likely will be erroneous or inappropriate regulatory response. Increases in scale, it is important to note, are permitted and encouraged by increases in the availability of energy and the elaboration of high energy technology.

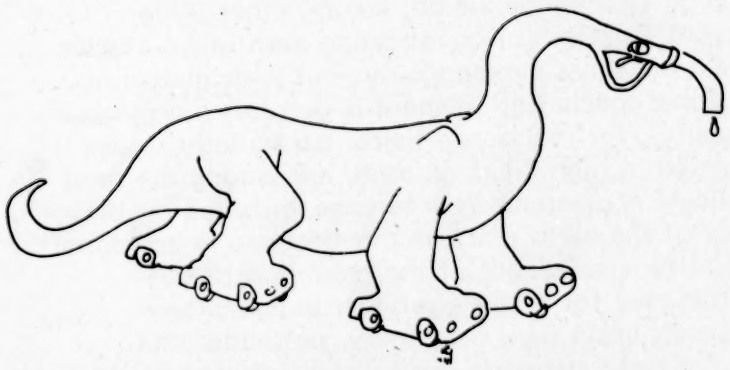
The likelihood of hierarchical anomaly also increases with scale. For instance, the deeper the regulatory hierarchy the more likely are time aberrations. Whereas excessive lag may be a problem, so may too rapid responses of high order regulators, for they are likely to destroy those of lower order if they constantly override them, throwing additional burdens on themselves, perhaps to the point of overload and breakdown. Moreover, premature responses of the higher order regulators may well be overresponses— resulting in more or less irreversible changes when something less drastic would not only have been sufficient but conservative of long term flexibility.

We are led here to several interrelated trends that seem to be common aspects of increased scale and which are limited in the absence of high energy technology. First there is what may be called "over-segregation." Increasingly large geographical units become increasingly specialized. Whole regions are turned into wheat fields, countries into sugar plantations. This specialization is allowed by high

GASTOWN
UN FUNNIES
PRESENTS
by GUSTAV RUSS YOUNGREEN 1974 ©
OILS WELL ON THE WESTERN FRONT
HEY MISTER. THERE'S A DINOSAUR IN YOUR GASTANK
QUICK! GET IT OUT BEFORE IT STINKS.
WE'VE A SPECIAL ON NOSEPLUGS.
IT DIED AND HOW DO I GET IT OUT
CAN I CONVERT OVER TO DINOSAURS?
NO. BUT JUST THINK WHAT THE PRICE OF SCRAP WILL BE.

energy technology which, among other things, provides means for transporting even bulky staples great distances inexpensively. But with increasing regional specialization there is decreasing ecological stability, for monocrop fields, particularly those planted in high yield varieties, are among the most delicate ecosystems ever to have appeared on the face of the earth. Part of this decrease in ecological stability is an aspect of the reduction of self-sufficiency for modern monocrop agriculture depends upon fuel, machinery, pesticides and complicated networks, and distant disruptions in such networks, as well as local problems, can disrupt local activities. With loss of local self-sufficiency there is also loss of local regulatory autonomy, and the homeostatic capacity lost from the local system is not adequately replaced by increasingly remote centralized regulators responding to increasingly aggregated and simplified variables (like the dollar values of crops) through operations increasingly subject to simple cybernetic impedances and time aberrations. Moreover, the regulatory responses of these distant regulators are often to factors extraneous to some of the local systems they effect. For instance, one effect of market response to increased vanilla production in Madagascar was decreased cash in Tahiti. We recognize here a consequence of over-segregation and over-centralization that has elsewhere been called "hyper-coherence" or "hyper-integration" (Flannery 1972, Rappaport 1970). The coherence of the world system increases to dangerous levels as the self-sufficiency of local systems is reduced and their autonomy destroyed and replaced by more centralized agencies whose operations are inadequate to the regulation of the complex systems over which they preside. Increases in coherence flow from developments in the high energy technologies of production, transport, processing and communication. Money has also helped to increase coherence by imposing upon the diversity of the world the specious simplicity of a single metric which forces all things into apparent commensurability. It may only be noted that the application of large amounts of mindless energy under the guidance of the simplified or even simple minded considerations that all-purpose money makes virtually omnipotent is in its nature brutal and almost bound to be destructive.

Over-segregation and over-centralization taken together are complementary aspects of a more general structural anomaly which may be called the "hierarchical maldistribution of organization." "Organization" is notoriously difficult to define; I take the term to refer to complexity and the means for maintaining order within it, and have been suggesting that organization at more inclusive levels seems to be increasing at the expense of organization at lower levels. Increasingly complex world organization is based upon decreasingly organized local, regional and even national social and ecological systems. It seems doubtful that a worldwide human organization can persist and



elaborate itself indefinitely at the expense of its local infrastructures, and it may be suggested that the ability of the world system to withstand perturbation would be increased by returning to its local subsystems some of the autonomy and diversity they have lost, as China seems to be doing. This is not to advocate fracturing the world system into smaller, autonomous self-sufficient systems, as undesirable as impossible. It is to suggest that redistribution of organization among the levels of the world system would serve well the world system as a whole.

There is another general class of maladaptations, combining with those discussed so far in complex evolutionary sequences. The basic form has elsewhere been called "usurpation", "escalation", and "overspecification". I speak here of special purpose subsystems coming to dominate the larger general purpose systems of which they are parts. When particular individuals become identified with special purpose systems they tend to identify the special purposes of those subsystems with their own general purposes, i.e., with their own survival, and attempt to promote those purposes to positions of predominance in the larger systems of which they are parts. As they become increasingly powerful they are increasingly able to succeed. The logical end is for a subsystem, or cluster of subsystems, such as a group of industrial firms, financial institutions and a military establishment to come to dominate a society. This eventually is nicely summed up in the deathless phrase "What's good for General Motors is good for America". But no matter how public spirited or benign G.M. might be, this cannot in the long run be true because for a general purpose system, like the United States, to commit itself to what may be good for one of its subsystems is for it to overspecify or narrow the range of the conditions under which it can survive, that is to sacrifice evolutionary flexibility.

I will only note in passing that this trend may lead to aberrations of sanctity. As lower order systems capture those of higher order they lay claim to their sanctity. To use a crude example, if the United States is one nation under God, and if, as Coolidge said, "the business of America is business", then business becomes highly sanctified. What is highly sanctified is resistant to change, and to sanctify the overspecific and material also reduces evolutionary flexibility.

The general trends noted here, while they became possibilities with the development of full time division of labor, perhaps not long after the neolithic revolution, are, of course encouraged by increasing power vested differentially in different subsystems of society. The development of high energy technology, which is concentrated in some, but not all subsystems, encourages both escalation and over-sanctification with their resulting overspecification.

There is a related concommitant. As industrial subsystems become increasingly large and powerful the quality and utility of their products are likely to deteriorate, for the subsystem's contribution to the society becomes less its product and more its mere operation, which provides wages to some, profits to others, and a market for yet others. Arms, which are both expensive and immediately obsolete, and automobiles into which obsolescence is built are ideal products, nor is there anything wrong with products that serve no useful purpose whatsoever. The product tends to become a by–, or even waste product of what might be called the "industrial metabolism" which is, ultimately, simply the operation of machines that men serve. Neither competition nor an independently established demand serves to regulate or limit industrial metabolism effectively because large industries are usually not very competitive and they can exercise considerable control over the demand to which they are supposed to be subject (Galbraith 1967).

The ultimate consequence of the promotion of the low order goals of industrialized subsystems to predominant positions in societies is not merely that the short-run interests of a few powerful men or institutions come to prevail, but that those of machines that even powerful men serve are ultimately dominant. Needless to say, the interests of machines and organisms do not coincide. They do not have the same needs for pure air or water, and being blind and deaf, machines have no need at all for quiet or for landscapes that refresh the eye. And whereas organisms have need of uncounted numbers of subtle compounds, the needs of machines are few, simple and voracious, and complex ecosystems are increasingly disrupted to satiate them. It is in accordance with the logic of a world dominated by the gargantuan and simple appetites of machines to tear the top off large portions of the State of West Virginia to extract a single substance: coal. Moreover, such abuse has become increasingly possible because high energy technology has freed men from the limits set upon ecosystem alteration by the need to extract the energy for alteration from the system being altered.

We are led beyond structural anomaly back to a question raised but not answered earlier, that of the variables to be maintained in homeostasis if a living system is to be adaptive, for some may be maintained at the expense of others. It has been

argued here that where highest order regulation has as its goal the maintenance of economic variables within goal ranges it may impede the maintenance of biological variables– organic, demographic and ecosystemic– within their ranges of viability. We may ask, even if the cybernetics of the system seem to be in good order, whether this may be properly regarded as adaptive.

If the goal of general purpose systems is simply survival the question of what is ultimately to be maintained in homeostasis is the question of what the term "survival" minimally implies. Here we may be reminded that the term adaptation is basically a biological term and that the systems with which we are concerned have living components. Survival has minimally a biological meaning. This is to say that the adaptiveness of aspects of culture may ultimately be assessed in terms of their effects upon the biological components of the system in which they occur, and that evolutionary changes perpetuating economic or political institutions at the expense of the biological well being of men societies and ecosystems are maladaptive. This assertion is not arbitrary for it reflects the way contingency is structured. There are no particular institutions with which a society could not dispense, but if man perished, culture would cease to exist. Survival is nothing if not biological.

But there are problems. For one thing given the "counterintuitive" nature of complex systems it is difficult or impossible to assess the long-run effects of any aspect of culture on biological variables. For a second, it seems not possible to specify any particular feature of biological structure or function that will always contribute to survival changes (Slobodkin and Rappaport in press). Although particular variables are, and must be maintained within goal ranges at particular times, these ranges, and even the systemic components of which they are states may be changed by evolution. Thus adaptiveness is not to be identified with particular variables, even biological variables, but with the maintenance of a general homeostasis in living systems, systems with biological components.

The notion of a general homeostasis is not fully operational but neither is it mystical. One of the implications of the argument presented here is that it is intrinsic to adaptive structure, to a certain ordering of processes and the systemic components in which they may occur, with respect to time, reversibility, specificity, sanctity and contingency. If such an order is maintained, general homeostasis, it is suggested, will prevail. This is to claim that the formal characteristics of adaptive structure have substantive implications. The primacy of biological considerations is implicit in the structure, for the escalation of non-biological variables to positions of predominance violates adaptive order with respect to specificity, contingency and possibly sanctity as well.

There can be no denying White's observation of long ago that sociocultural evolution has been impelled by increases in energy harnessed. I have argued, simply, that such increases have not necessarily enhanced adaptations or adaptiveness and may even have encouraged maladaptive trends, some of which– there surely must be others– have been suggested here.

As energy flux has increased, the disparity between the direction of cultural change and the goal of biological survival has widened, and it may even be asked whether civilization, the elaborate stage of culture with which are associated money, great internal differentiation and fuel technology, is not maladaptive. Indeed, if civilization is an inevitable outcome of culture it may be asked if culture is adaptive. To the extent that cultural conventions are arbitrary men may devise aberrant regulatory hierarchies and maintain them in the face of mounting difficulties. This does not seem possible for other creatures, nor could others with less powerful intellects develop ideologies that not only mask from themselves the maladaptiveness of their institutions, but apotheosize their maladaptive features. A yet more radical question is suggested here. If civilization with its maladaptive regulatory hierarchies and misguiding ideologies is an inevitable outcome of culture, and culture of the human level and type of human intelligence, is human intelligence in the long run adaptive, or merely an evolutionary anomaly bound to be destroyed by its own contradictions, or the contradictions of its products? (See Bateson 1972.)

It may be asked, at the end, whether the dark view of social evolution proposed here is nothing more than slightly passe doomsday talk or whether it is not, in any case frivolous. We are stuck with human intelligence, and are hardly less bound to such of its offspring as high energy technology. But to recognize that intelligence and its products have set as many adaptive problems as they have solved may be the first step toward their solution. It is, I think, the task of anthropologists among others to analyze the structures of social systems in the terms of adaptation, and to develop theories of what the structures of healthy adaptive systems may be like as well as theories of maladaptation and its amelioration. Some crude suggestions have been made here, but the necessary empirical and theoretical work has hardly begun.

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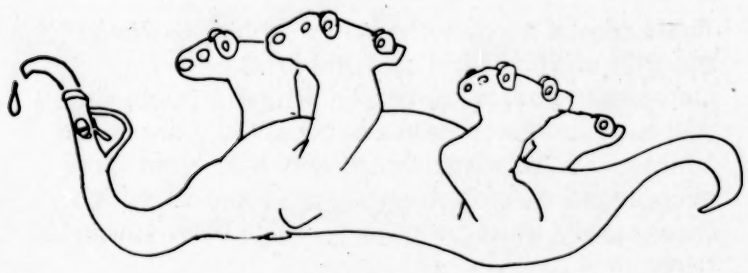

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Nuclear Firewood

This letter appeared in **Science,** *Feb 1 1974.*

Important aspects of the energy shortage are being ignored in both science and government. We tend to forget that most of the energy used by man is solar energy that has been fixed recently through photosynthesis. This energy provides food, fuel, fibers, and services that are essential for a habitable environment. Although the total amount of energy available as net primary production through this route has been estimated as 20 times the amount of energy in current use from fossil fuels, nuclear power, and hydropower, these flows of energy from the sun are being reduced. When the complex political, social, and economic systems of industrialized nations falter, as they appear to be doing at the moment, we turn immediately to biotic resources that are close to us. We substitute fish for beef, wood for fuel. Mounting world food shortages are contributing to the pressures on these resources. Shortages of both oil and food will get worse: worldwide demand is soaring, and supplies are limited. Reckless efforts to "solve" an energy problem that is unsolvable in the current context of growth threaten to speed destruction of renewable resources. Acid rains are a good example. Relaxation of air pollution standards for sulfur will result in continuation of the trend of rising acidity in rain in the Northeast. There is little doubt that a decade or more of precipitation with a *p*H of between 3.0 and 4.2 will reduce the net production of forests and agriculture. A 10 percent loss of net production in the New England states would be the equivalent of the power output of 15 1000-megawatt reactors. Would the people of New England agree to supply such a subsidy to the rest of the country if they had a choice?

There is no simple technical or social solution to the shortage of energy. Growth in energy consumption in the pattern of past years is over for the present. In addition, biotic flows of energy are now being lost, often irreversibly; the biota is being mined. Environmental problems are not simply those of adjusting techniques of energy production to reduce intrusions on the environment; they also include the preservation of the flows of energy— including food, materials, and services— through the biota to man. The shortage of fossil fuels presents a challenge to technologists to find more efficient ways of exploiting biotic energy flows on a renewable basis. The problem warrants, but does not have, major consideration in the President's energy program. Facilities comparable to those of a major national laboratory should be devoted to the problems generated by the worldwide spread of biotic improverishment that is caused in large degree by current rates of exploitation of nonrenewable energy sources.

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Consider Trees as Energy Converters

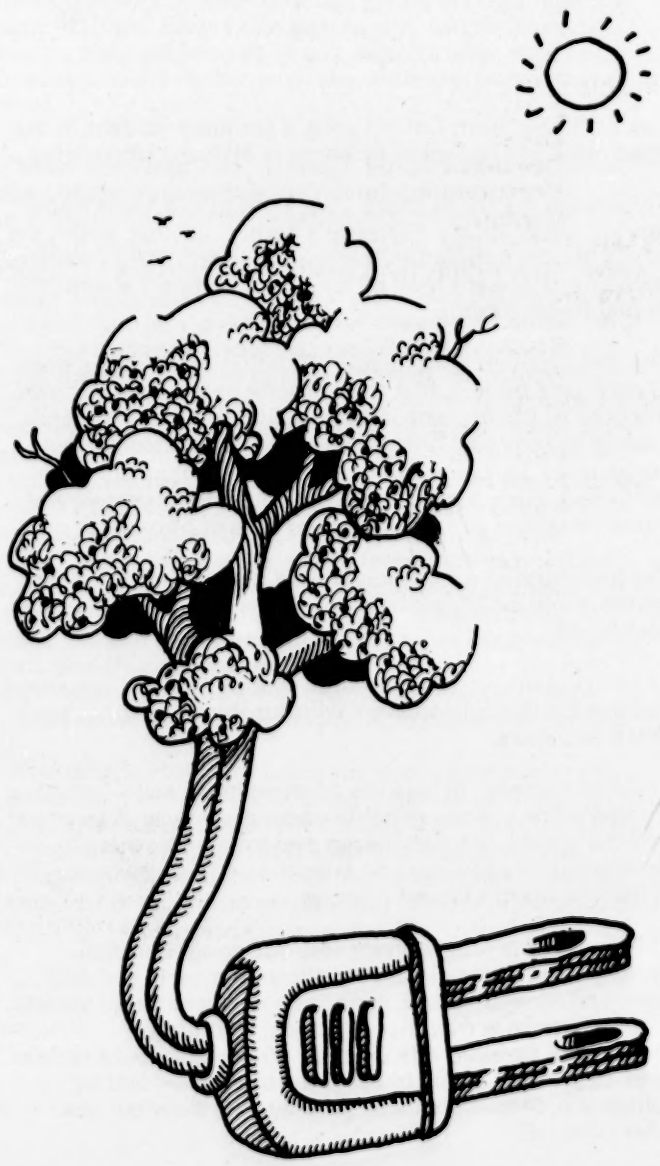
Technology Review, *Oct. Nov 1973, ($10/yr. 8 copies, from Rm. E 19-430, MIT, Cambridge, Mass. 02139) carried this item.*

A 400-mi.^{2} "energy plantation"— a forest 20 miles on a side with a wood-fired steam power plant at its center— would be a self-sufficient converter of solar energy to electrical energy at the rate of about 400 Mw./yr. With all the expenses of land ownership, fertilizing, harvesting, and processing considered, the plant's fuel might cost between 70 cents and $1/million B.t.u., compared with 60, 50, and 30 cents/million B.t.u., respectively, for oil, coal, and gas in 1972.

This vision of a cost-effective method of converting solar into electrical energy results from computations by George C. Szego and Clinton C. Kemp, President and Vice President, respectively, of Inter-Technology Corp. Though it is grossly inefficient in terms of the amount of available solar energy converted into fuel (somewhere between 0.4 and 0.7 per cent), the "energy plantation" system offers some interesting advantages:
—Capital costs are substantially lower (about $1,000/kw.) than for any other method now proposed for large-scale utilization of solar energy.
—There are no storage problems, as with other solar energy systems; the trees themselves perform the storage function on cloudy days.
—Vegetable matter— either agricultural crops or pine softwood— contains less than 0.1 per cent sulphur, less than virtually any fossil fuel.
—Long-range ecological implications are minimal; the carbon dioxide released in burning the fuel will be the same amount as was consumed during its growth, and the same "recycling" pattern will apply to the waste heat of combustion.
—The by-product of the combustion process can be directly returned to the land as fertilizer.

The cost figures cited by Messrs. Szego and Kemp depend on only modest increases in the amount of fuel which can be harvested for a power plant compared with present forestry operations geared to the production of pulpwood. "At solar radiation conversion efficiencies only two to three times those already being achieved fortuitously from forestry-type operations," they write in *Chemtech (May, 1973, pp. 275-84),* "fuel value probably can be sold on a sound business basis."

—JM



Law of the minimum

Which is the special material without which industrial technology and its civilization cannot function? When does it run out?

The following nomination of phosphate and discussion of the Law occurred in a follow-up correspondence-and-comment about **World Dynamics** *(by Jay Forrester, $9.75, Wright-Allen Press, Cambridge Mass) published in the excellent journal of Friends of the Earth,* **Not Man Apart** *($5/yr, monthly, from: 529 Commercial St., San Francisco CA 94111).*

Anne Brower sent us the piece. If you're moved to answer the questions in it, write to **Not Man Apart.** *Send us a carbon.*

—SB

Now, let's hear from David Laing, a graduate student in the Department of Geological Sciences at Harvard University:

"Forgive me if I try to shake your faith in the 'most hope-inspiring graph' in Jay Forrester's book ... In that graph, the world's human population is shown as indefinitely stabilized, ideally, at its present level of about 3.5 billion. I submit that this will be impossible.

"The real problem with 'model' situations such as the ones in Forrester's book is that they usually only consider *broad categories* of phenomena in the prediction of future trends. In actuality, any *one* phenomenon within a category may impose much narrower limits on the model than are anticipated. Such is certainly the case with the category of natural resources and the particular case of phosphate rock.

"I've just finished a study on United States phosphate rock reserves, from which vantage I can offer the following sober conclusions:

"1) The present world population is about two billion above what the Earth could support without the use of phosphate nitrate fertilizers.

"2) Given present US reserves of phosphate rock— including very low grade ore not minable under present economic and technical conditions— and given present trends, these reserves will be exhausted no later than 110 years hence. The US has the world's largest reserves.

"3) Phosphate is progressively lost during agricultural, industrial, and domestic use by dissemination in soil and water, and, unlike nitrate, cannot be reconcentrated except by tertiary sewage treatment— which, assuming a theoretically possible efficiency of 90 percent could reclaim about 12 percent of the phosphate consumed— and by geological processes that are not only very slow but also rather unusual.

"4) Phosphate fertilizer use must increase 2.7 times faster than agricultural yield— an empirical discovery— due to inefficiency of organic uptake. The excess winds up in our natural water systems, intensifying problems of eutrophication along with nitrate, which, unlike phosphate, is toxic in concentrations that are being exceeded now.

"Thus, we have an immediate dilemma: the problem of growing eutrophication and toxification of our natural water supplies, and a more distant dilemma: the eventual exhaustion of our phosphate reserves. The former will probably somewhat delay the latter because there will come a point where the pollution problem will create a feedback resistance to increases in fertilizer application. With the brake on agriculture, this will be the point where we start 'farming the sea' (and the lakes!) for phytoplankton (especially blue-green algae) to feed our exploding masses. Then, when our phosphate reserves are finally exhausted, we must bring the population down to a level— between one and two billion— that the Earth can support without artificial fertilizers."

Mr. Laing stretches the truth a little in saying that the "most hope-inspiring" graph in **World Dynamics** shows population "indefinitely stabilized." Professor Forrester, in his book, and I, in my review, both called attention to a down-turn in the population curve in the latter part of the next century, indicating that despite corrective measures that had produced fairly long-term stability, depletion of natural resources had again become a limit on population. By coincidence, in fact, the graph shows a population down-turn almost exactly 110 years hence, when Mr. Laing says phosphate reserves will be exhausted. I agree with Mr. Laing, and I'm sure Professor Forrester does, too, that the stability indicated in the "most hope-inspiring" graph cannot be permanently sustained short of total recycling with 100 percent efficiency. What this impermanent stability does that inspires hope is buy time for us to evolve more lasting solutions— one of which, I agree with Mr. Laing, must be population *reduction.*

There is no reason I know of why the facts about phosphates outlined by Mr. Laing could not be built into a world model, but there probably wouldn't be much point in it unless the model builders could be certain that phosphates would be *the* limiting factor. Do we know enough to be sure that some other essential— something essential, that is, to the maintenance of an inflated population of four billion or more— won't give out before phosphate rock does? What if we have only a 60-year supply of something else essential to sustain our overinflated population? In that case, incorporating the facts about phosphate rock into the world model wouldn't improve its predictive capacity.

The Law of the Minimum provides, as I understand it, that if you have less than the minimum amount needed of any essential, it does you no good whatever to have surpluses of every other essential. The obvious question arises, what essential will we run short of first? Mr. Laing suggests

that it may be phosphates. And so it may. But until that is pretty well established, phosphate figures probably don't belong in a world model, which, in the nature of things, must be general rather than specific and simple rather than complex.

Query: Do any readers of NMA have substantial reason to believe that the Law of the Minimum will become operative while we still have phosphate reserves because we've run out of some other essential? Do you have a candidate for the essential resource that, by running short, will soonest become a limitation on population? If so, let us hear from you.

Mr. Laing has a valid point, it seems to me, in saying that a single, particular natural resource, by nearing exhaustion, might impose a limit on growth while "natural resources" as a broad category were still in relatively plentiful supply. And he is right in saying that Forrester's world model does not take this into consideration. But this does not dampen my enthusiasm for the model one whit. Why? Because I do not conceive of the model as being predictive in a chronological sense. At least, that doesn't seem to me to be its special virtue. The Forrester model's special virtue, it seems to me, is in predicting *ultimate* outcomes: not so much *when* a pollution crisis will occur under certain circumstances, but that under those circumstances, a pollution crisis *will ultimately occur;* not so much *when* resource shortages will impose limits on growth, but that shortages *will ultimately limit growth.*

You might argue that if I'm right, Forrester's model merely demonstrates the obvious. Well, in a sense that's right. It has been obvious to a few people for a long time, and to a growing number of us for a short while, that growth cannot continue indefinitely in a finite world with finite resources. Nevertheless, it's still vitally important to demonstrate this "obvious truth" in convincing fashion. There's not a single nation so far as I know, nor any lesser political jurisdiction, that systematically bases public policy on the obvious truth that aspirations for perpetual growth can lead only to ultimate collapse.

Query: Can any readers furnish exceptions to the rule that political jurisdictions do not yet base public policy on the fact that perpetual growth is impossible? We would be interested to hear of any laudable examples.

Based on his knowledge of agricultural yields in the absence of artificial fertilizers, Mr. Laing calculates that a world without such fertilizers could support between one and two billion people— one half or less of our present world population. This doesn't mean, of course, that a world population of between one and two billion would be optimal, or even that a population of such size could necessarily be sustained permanently. Shortage of another natural resource, or shortages of a combination of them, might impose even lower limits on population. Which brings up a concept that fascinates me: that of "optimum population."

Optimum population is generally defined, I believe, as the number of people that can be permanently sustained on Earth at a tolerable standard of living. Mr. Laing's hypothetical population of one to two billion is "optimal," I take it, only in relation to agricultural productivity in the absence of artificial fertilizers. Does this presuppose efficiency in the distribution of food that may not be attainable when mechanized transportation is seriously affected by shortages of fuels and lubricants? If so, "optimum population" may be a good deal smaller than one or two billion, and the problems involved in voluntarily contracting population to a sustainable level may be correspondingly greater.

Query: Has any reader of NMA firm convictions, based on reasoning that he can share with us, about the optimum population of the Earth? Can any reader, whether he has worked on the problem yet or not, suggest what might be the best way to determine what the optimum population of Earth is?

The "most hope-inspiring" graph in **World Dynamics** doesn't presage Utopia. A continuation of its natural resources curve indicates the complete exhaustion of nonrenewable resources in about 700 or 800 years (even assuming a quite high level of recycling). The quality of life curve stabilizes for about one century at the peak 1950 level before veering down again, but let's not forget that the average quality of life in America in the fifties was unsatisfactory, and in the world as a whole, average quality of life at its historic peak was pretty pitiful. The capital investment curve remains at current levels through the year 2100— which accounts for the steady and ominous drain on non-renewable resources. The pollution curve also stays level through the next century, but many of us would insist that current levels of pollution are too high. Interpreted in this way, the "most hope-inspiring" graph justifies little long-term optimism. It does indicate, however, as Professor Forrester puts it, that a no-growth condition of stability is at least "conceptually possible." And it indicates that in theory, at least, we can attain a tolerable condition of stability that may last long enough— about a century— to enable us to work toward conditions compatible with long-term stability and survival.

We thank Mssrs. Hirst and Laing for their contributions to this discussion, and hope that they, together with the rest of you, will feel moved to carry it further. For the editors agree with Professor Forrester— and with The Club of Rome, which sponsored his work— that the necessity of achieving a transition from growth to equilibrium is "The Predicament of Mankind." Not *a* predicament; *the* predicament.

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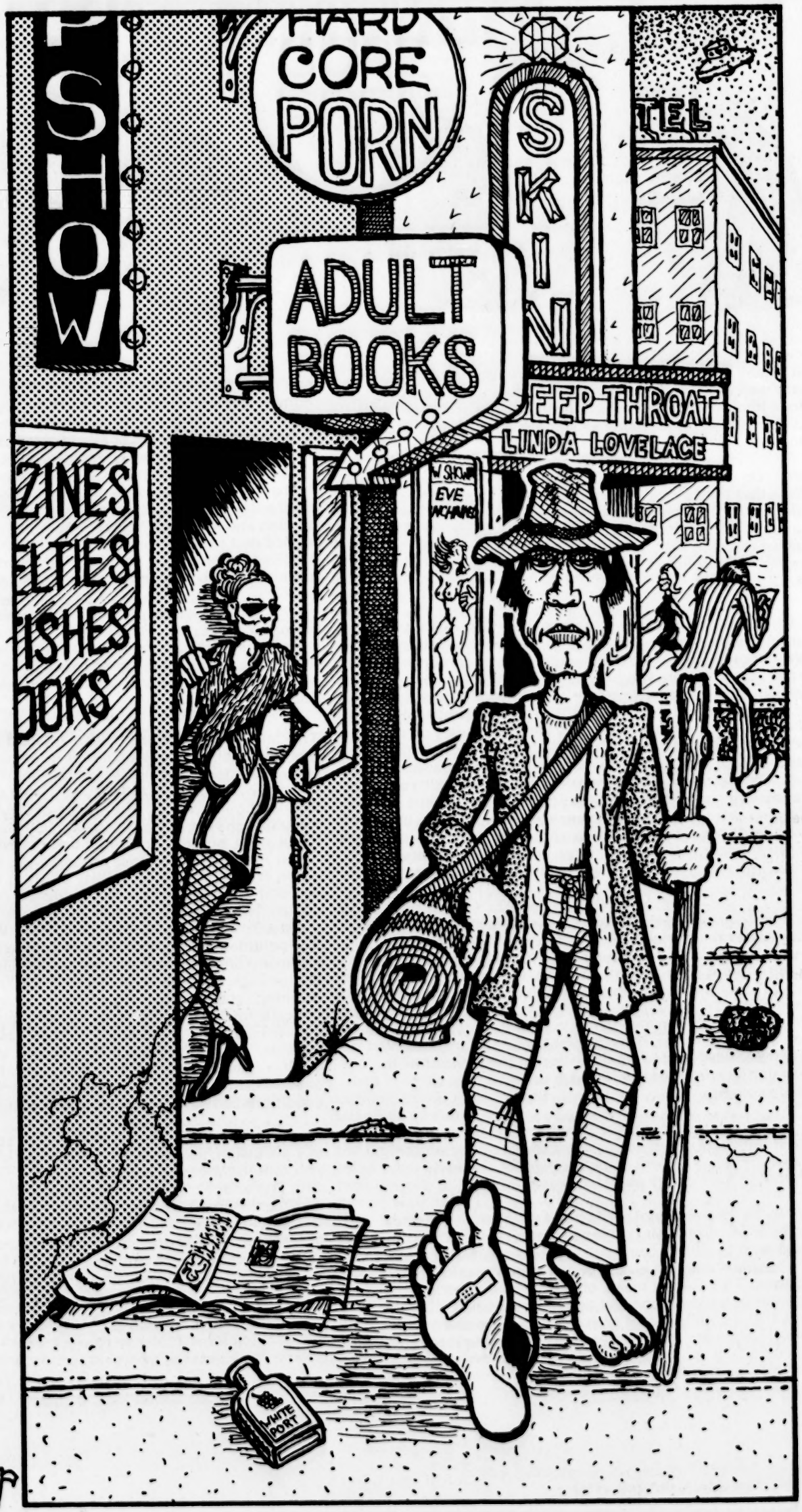
TONGUE



by Paul Krassner

Tongue Fu

BY PAUL KRASSNER

A few years ago, an American married couple, who were both working for the U.S. Census Bureau, decided to have their baby by induced labor so that it would be included in the 1970 census figures.

This story is dedicated to that child.

"Losing is like dying."
—*Washington Redskins Coach George Allen*

"The only thing to be afraid of is failure."
—(Kung Fu) *television show*

"If you feed a starving person Ex-Lax, all you get back is the Ex-Lax."
—*Alexander King*

PART ONE

1

CAPTAIN MEDIAFREAK TAKES A TRIP

Click!

The Statue of Liberty is wearing a huge brassiere. A disembodied female voice asks in a sultry whisper: "Do your huddled masses yearn to breathe free?"

Click!

A young man in Army fatigues is juggling several tear-gas grenades and rifles-with-bayonets-extended alternately in the air, accompanied by the band playing a schmaltzy rendition of *Come On, Baby, Light My Fire.*

Click!

"—confessed to police today," a newscaster is saying as he taps his foot in rhythm with his speech, "that he had been hired by a Safeway Supermarket to put *Kosher for Passover* labels on canned foods which were not actually kosher—"

Click!

Striding barefoot in the sunset along 42nd Street comes Tongue Fu. Under a floppy hat and bangs-covered forehead, his eyes reveal an ancestry that is half Japanese and half American. He is carrying a rolled-up sleeping bag. On his back is a knapsack.

It has been a lengthy journey. First, a freighter across the Pacific Ocean. Then, a bus from San Francisco to New York City. Now he stands on the sidewalk, watching with fascination as a pizza maker throws his lump of dough over and over toward the ceiling.

After a little while, the pizza maker scowls at him through the large window that separates them. In response, Tongue Fu parts his lips slightly. Gradually, he sticks out his tongue at the pizza maker, inch by mottled red inch.

The pizza maker ogles in amazement. For Tongue Fu's tongue is approximately fifteen inches long. The lump of dough falls on the pizza maker's head while he stares in disbelief.

Tongue Fu walks away, a satisfied expression on his face....

Flashiebackie:

The venerable teacher, Say When Daddy, glazed blind eyes set off by a white Van Dyke goatee, holds out a small item in his hand.

"Anteater," he says to young Tongue Fu— placing him at a proper distance by putting his other hand on the freshly-shaved head of his student and biological son— "quickly, snatch this peyote button from my hand."

Out darts Anteater's unusually long tongue. But Say When Daddy closes his fist with plenty of relative time to spare. He smiles with patient understanding.

"Tough nookie," he says. "You must always remember that whether your gift of tongue is to be a curse or a blessing depends upon how skillfully you learn to manipulate it. Only after you have thoroughly mastered the art of liberation will you be able to flow with the commerce of exploitation which is the other side of that coin along whose ridged edge you wish to roll through life. All right, Anteater, you may put your tongue back in your mouth now...."

Inside an abandoned Times Square newsstand, Captain Mediafreak is tripping in his basket. He has no legs and only one arm. At the exact instant that a temporary power failure shuts off his color television set, Tongue Fu knocks on his door.

Captain Mediafreak gets an adrenalin rush as his heartbeat suddenly increases. He hardly ever has visitors. He points his TV channel selector, trigger finger ready, at the tall stranger who begins to enter and speaks in a halting manner.

"Please. I do not intend to startle you. I merely seek shelter for the night."

"Hey, that's really weird. I was just watching you on the tube. I must've dropped too much acid this time. Every Thursday evening I ingest a few tabs of LSD as my own private religious ritual."

"Is not too much enough?"

Captain Mediafreak nods his curly blond head, upon which sits an American Airlines Junior Astrojet pilot cap.

"Anyway," he says, "of course you can stay here." He lights a candle. "I sure hope the power goes back on soon. Norman Mailer's on Dick Cavett tonight."

Tongue Fu empties out his knapsack, which, except for a custom-tailored edition of the *I Ching,* a cooking pot, a box of matches, packets of herbs, a toothbrush and a kazoo, is completely filled with soy beans.

"Listen," Captain Mediafreak says, "how come you did that thing to the pizza maker with your tongue?"

"I am a mutation. That is all I know."

"No, I don't mean how. I mean why?"

"It was an act of altruism. The pizza maker now has a new daydream to occupy his mind when he is working. Also a conversational tidbit to share with his friends."

Tongue Fu rolls out his sleeping bag onto the floor. He sits on top of it in the lotus position. His hands hover just above his knees, palms upward, thumbs and forefingers forming a bridge of his outstretched tongue.

"Wow," says Captain Mediafreak. "I'll bet you can

give yourself great head."

Tongue Fu withdraws his tongue back into his mouth in order to answer.

"I do not. I remain celibate so long as I continue in search of my soulmate. But first I must find my mother. And my sister. I have never known either. That is why I have come to America."

When the electricity returns, Dick Cavett is asking: "Do you write better before or after sexual intercourse?"

"During," replies Norman Mailer, switching to W.C. Fields' voice. "One might even say that one best lubricates one's heroic writing instrument with the tart nectar of Bartholin's glands."

2

TONGUE FU MEETS HIS MOTHER

In a funky mid-Manhattan apartment, a dignified grey-haired woman in a nurse's uniform is dusting her Tiffany kerosene lamp. She is waiting for a visit from her son. She hasn't seen him since he was an infant.

Outside, the pace on this Friday afternoon is restless. Tongue Fu observes people rushing along the sidewalk only to stand on line for a bus. A traffic light signals *Don't Walk*, and he is bypassed by citizens hurrying frantically across the street.

"When the sign says *Do Not Walk*," Tongue Fu remarks to a hot chestnuts vendor on the corner, "it is perceived as *Run*."

"It don't say *Do Not*, it says *Don't*, can'tcha read English, buddy?"

"Yes. But I do not ever use contractions."

"Oh, yeah? Why don'tcha?"

The traffic light signals *Walk*. Tongue Fu smiles at the hot chestnuts vendor and shrugs his shoulders as he steps off the curb. When he reaches the other side of the street, he sees a metal tab in the gutter, discarded from the top of a soda pop can. He automatically picks it up....

Flashiebackie:

Walking along the beach, Say When Daddy steps on a jagged piece of glass, broken off from a Coca-Cola bottle. Wincing, he draws young Tongue Fu's attention to it.

"Did you not take notice of this object," the blind old man asks, "that which now causes my foot to bleed so profusely onto the sand?"

"I am sorry, master."

"No, do not apologize. But you cannot attain true inner peace without practicing responsibility. You must walk along this beach each morning and pick up whatever might prove dangerous to someone else."

"How long must I continue to practice such responsibility?"

"Until you find yourself doing so without being aware any longer of the reason."

"But suppose I am the only one to do this?"

"Why, then, Anteater, you should be pleased, for that will show you have no ulterior motive, such as wanting something in return. You shall learn how to maintain conscious innocence."

"How is it possible for innocence to be conscious?"

"Isn't that a bitch?" replies Say When Daddy, applying a tourniquet to his wounded foot.

"Is that not a bitch?" repeats young Tongue Fu....

"Because of the length of my tongue," he is now telling his mother what he didn't tell the hot chestnuts vendor, "I have had to learn to speak very carefully. So that it will not show."

"My only obligation is to explain the circumstances which brought about your abnormal tongue. I promised your father that, before I left Japan. During World War Two, he was a volunteer Kamikaze pilot. They had all been trained in mysticism. It was necessary for them not to be concerned about death. Not when the premeditated loss of their own lives– in the process of destroying an American aircraft carrier– would save so many other Japanese lives.

"However, in 1945, there were those among their leaders preparing to surrender. Nevertheless, Japanese intelligence agents discovered that the United States had so much invested in developing the atomic bomb that they had to be dropped. Say When Daddy's suicide mission was to prevent those planes from ever taking off. But his plane was shot down first.

"He survived, except for his eyesight. His flying goggles had melted into his eyeballs. I was an Air Force nurse at the time, and I happened to be assigned to his case. He was so ashamed to find himself alive in an enemy hospital that Hara-kiri seemed to be his only alternative.

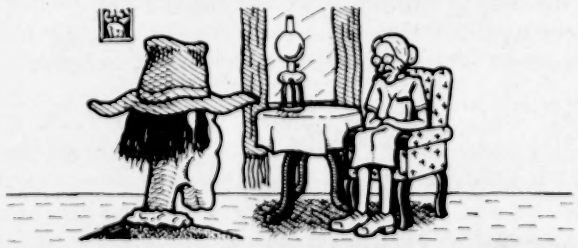
"Well, it was as though I had become a personification of the life force, overshadowing even the urge of his spiritual conditioning. And so you were conceived one night in an American hospital bed somewhere between Hiroshima and Nagasaki."

The tea kettle boiling on the stove whistles at such a high pitch that one of the teacups breaks. Tongue Fu's mother pours the tea into two other cups.

"Nine months later," she sighs with tortured regret, "I was nursing you for the first time. And your tongue... unreeled ... around my nipple. I went into shock. The doctors said your condition was a result of atomic fallout affecting the genes.

"Forgive me, my son, but I had to flee. I just couldn't bear to give suckle even a second time to this... freak. So I left you with your father in a monastery.

"I returned here. Met a nice man. Got married. Gave birth to a normal daughter. Eventually got divorced... and am settled in my life. I work at a hospital; I have my friends.



"The last I heard of your half-sister, she was pregnant and unmarried, in that order. We don't have much contact. She's a disciple of some guru. Here's her picture. Now please go. It's the kindest thing you can do."

In a slight state of confusion, Tongue Fu wanders along Broadway.

He goes into a dilapidated arcade with a sign in front that says AMUSEMENT CENTER. He stumbles past the mechanical Gypsy Lady in an isolation booth waiting to tell his fortune. Past the steering wheel that would permit him to drive down an obstacle-filled revolving road. Past the machine that he could stand on to have his feet vibrated. Past the miniature hockey game. Past the little metal prizefighters ready to go into action at the drop of a coin.

He finally stops at an anti-aircraft gun. Faded lettering invites him to *Bomb the Japs Off the Map!* "Not still," he mumbles and walks out determinedly. Chinning himself easily up over the entrance, with his tongue snapping out again and again like a secret organic weapon, he selectively destroys certain letters in the word AMUSEMENT so that now the sign in front reads SEMEN CENTER.

In the window, a display of rubber masks resembling show business and political celebrities all stare unseeingly at the strangeness of his performance, with the exception of Jacqueline Kennedy Onassis, who winks at him.

3

THE DEVELOPMENT OF A NEW FRIENDSHIP

The abandoned newsstand where Captain Mediafreak lives is furnished sparsely: color TV set; AM-FM radio; hi-fi stereo, records and earphones; tape recorder; photography equipment; motion picture camera, tripod and cans of film; stacks of newspapers, magazines and underground comic books, including complete collections of *Zap* and *Slow Death*.

Plus a telephone, which he uses mostly to call up radio talk shows, which is what he's in the middle of doing at the moment.

"So the reason I'm against all censorship is that it's diametrically opposed to the essential purpose of education. People have to be allowed to make up their own minds."

"All right, thank you, caller," a professional voice interrupts. "Appreciate your point of view."

Captain Mediafreak hangs up, dials the same number and is put on hold. When he goes on the air again, he uses a different voice, somewhat nasal in quality.

"I'd like to disagree with that previous gentleman. I'm <u>for</u> censorship. My wife uses the television as a babysitter, you know, and there's an awful lot of violence. Our children are beginning to take all the violence for granted, and there are virtually no options. That's not entertainment, it's brainwashing. And in my opinion, brainwashing <u>should</u> be censored...."

Flashiebackie:

Young Lieutenant Mediafreak has all of his arms and legs. His curly hairlocks are shorter. He sits in the front row of a movie theater, watching his first Andy Warhol film. It's called *Audience*, and consists entirely of leisurely panning over reactions of the people in each audience waiting for the scene on the screen to change. Therefore it's different at every showing.

When he sees himself, Lieutenant Mediafreak immediately opens his guitar case and takes out an electric saw. He proceeds to saw off his left leg, hearing himself scream in utter pain, as surrounding faces on the screen express their encouragement.

"Right on!" the audience yells.

Then his right leg.

"Right off!" the audience yells.

Then his left arm.

"Right arm!" the audience yells.

Lieutenant Mediafreak faints. The electric saw falls on the ground, further dismembering the bloody limbs already lying there as though it were in heat.

An usher calls the police.

The police call the newspapers.

The New York Daily News headline:

Self-Mutilator Denies
It Was a Drug Freakout

The New York Times headline:

Perpetrator of Public Masochism Claims
Artistic Statement Was Only Intention

The New York Post headline:

Movie Victim Sues Warhol
For Invasion of Privacy....

It never occurs to Harry Reasoner that while he is delivering his Commentary on the ABC Evening News, Captain Mediafreak is initiating his house guest into the rite of cannabis-sharing.

Tongue Fu inhales the smoke carefully; coats his lungs with resin; then, in the very act of exhaling, gently passes the joint, which he holds, not between his fingers, but curled in the tip of his long parched tongue.

That night they decide to go out for dinner and the theater to celebrate their new friendship. Tongue Fu carries the basket from which Captain Mediafreak navigates their course. They arrive at an elegant hotel on Park Avenue.

Since they are the only ones in the elevator, Tongue Fu takes the liberty of pressing the button for the seventeenth floor with his tongue. As the numbers light up, he counts out loud.

"...nine...ten...eleven...twelve...fourteen– where is thirteen?"

"Listen, there's a lot of places– office buildings, apartment houses, hotels– where they had the architect skip the thirteenth floor because it's supposed to be bad luck. There's even airplanes where they don't have a number thirteen seat. It's the same principle. They don't wanna lose any business. They're just catering to superstitious people, is all. The worst part of it is, the people who live on the fourteenth floor– they think they're getting away with it."

Walking along the corridor, they stop at a door that has a cart in front of it, containing a pair of trays with leftover food from Room Service. They share these mostly-eaten delicacies in the stairwell. Dessert is found on the floor below.

Then they depart for the theater, where a revival of *No, No, Nanette* is playing. They wait outside until the first act intermission. Mingling with the audience in the lobby, they return inside for the second act, finding an available seat in the balcony. Tongue Fu holds the basket on his lap.

"Why do they call it legitimate theater?" he asks on the way home. "Is there such a thing as illegitimate theater?"

"Absolutely," replies Captain Mediafreak. "Real life. Or maybe the movies."

"I have never been to a movie."

"You oughta see *Deep Throat*. Some people say that's illegitimate."

"I have heard the phrase. Other boys at the monastery in Japan used to whisper about deep throat as a very specialized form of yoga."

They stop to watch a potato knish maker. His style strikes Tongue Fu as being more mellow than the pizza maker, perhaps because his task is less hectic.

A wizened panhandler straggles by and sputters, "Can ya spare a quarter for a Pina Colada?"

"I am sorry, but I do not have money. But come join us. Regard the potato knish maker aid the potato to achieve knishhood."

"Aw, never mind," says the panhandler, only to be replaced by a neatly-suited thin black man wearing a fedora and politely offering to sell a copy of *Muhammad Speaks*.

From his basket, Captain Mediafreak pipes up: "No, thanks. I'm a subscriber."

4

LINDA LOVELACE SERVES AS A CATALYST

A doorbell chimes the first six notes ("They asked me how I knew...") of *Smoke Gets In Your Eyes*.

Chocolate Graham hums the next five notes ("...my true love was true"). She is twenty-three years old. She stands exactly four feet tall. Her skin is brown. Her head– close natural hairdo– bounces like licorice cotton candy as she skips like a child to answer the door.

A periscope arrangement enables her to look through the peephole. A special doorknob installed two feet off the ground enables her to open the door.

A deliveryperson hands her a box.

"Oh, good. My new calling cards. I'd just about run out of them."

One of the cards is glued to the outside of the box. A rainbow reaches from one lower corner of the card to the other. Another rainbow, upside-down and interlocking with the first rainbow, reaches from one upper corner to the other. Fancy embossed lettering reads:

Can You Pass
the CRAP Test?

Below, in tiny type, there's a telephone number.

The deliveryperson asks, "What's this crap test anyhow?"

"It's sort of a private joke."

"Well, I mean, whattaya do with the cards? Are you in some kinda business?"

"No, it's more like a hobby. I just give them to certain people when they're not looking."

"You could slip 'em in their pocket, and they wouldn't even know the difference."

"That's exactly what I do, sometimes."

"I mean because you're the right height, y'know what I mean? Remember Johnny the bellhop, he used to go "—the deliveryperson cups his hands to his mouth and bellows— "Call for! Philip Morris! I dunno if he was a dwarf or a midget, I can never tell the difference, not that I hafta tell the difference that often. Which are you, by the way? I mean I hope you don't mind my asking."

"Oh, that's okay. I'm not a dwarf or a midget. I'm a pygmy...."

Flashiebackie:

Young Chocolate Graystroke's hair is twisted into many mini-pigtails, each tied with a bright red ribbon. She is sitting in the parlor of her parents' mansion. They are an elderly Caucasian couple.

Mother: "Chocolate, we've decided that the time has come to tell you that you were not actually born to us."

Father: "The truth of the matter is, we kidnapped you."

Mother: "You must understand, your father was an orphan himself."

Father: "Yes, my parents were killed in a plane crash in an African jungle. However, the body of my younger brother— you've seen baby pictures of Uncle Tarzan in the family album— was not found among the wreckage."

Mother: "So we eventually went on a personal pilgrimage and, to make a long story short, we took you."

Father: "I considered it a case of retroactive cultural exchange."

Mother: "But, Chocolate, we want you to know that we love you just as much as if you had been legally adopted...."

It's Saturday evening at the old abandoned newsstand.

"Do you desire," Tongue Fu asks Captain Mediafreak, "to go see a movie?"

"Nah, you better go alone. This is family night for me. I'll give you some cash, though. They don't have intermissions at films."

"Where is your family?"

"Right here." With his one and only hand, Captain Mediafreak gestures toward his TV set. "The Bunkers at eight o'clock— Archie and Edith and Michael and Gloria and their neighbors— and then at eight-thirty there's *Mash*, with Hawkeye, Trapper, Hot lips, Radar and all their gang."

"These names do not mean anything to me."

"Yeah, well, I'm closer to them than to my own flesh-and-blood family, I'll tell you that. And at nine o'clock, there's Mary Tyler Moore, and Rhoda and Lou Grant and Ted Baxter. I'd really miss them if I went a whole Saturday night without seeing any of 'em."

"But is it not odd that your pleasure should come from watching other people live their lives for you?"

"Listen, it's not even other people. It's actors pretending to be other people. But, like, at nine-thirty there's Bob Newhart and those other characters on his show— they're more fun than most of the real people I know. And then at ten, it's Carol Burnett, with Harvey Korman and Vicki Lawrence and Lyle Waggoner and Tim Conway— I consider them family— they're delightful compared to my actual relatives. And I don't even have to do anything. But I'd rather spend an hour watching them do skits and songs than sit around with my relatives discussing Carol Burnett's skits and songs, right?"

And so Tongue Fu goes to see *Deep Throat* by himself.

On the screen, a gigantic close-up of Linda Lovelace is sucking away at an unidentified throbbing penis. For Tongue Fu, the fantasy of probing the recesses of her throat and sensuously rubbing her displaced clitoris to climax with his own unique tongue, results in such a holy hard-on that he becomes convinced he has finally met his soulmate.

To inquire about her, he approaches the office of the theater manager, Buff Mogul, just as the police swoop in to arrest him for displaying an obscene film. Tongue Fu gets arrested along with him, as a material witness, because his erection won't detumesce. It remains aloft all the way to the precinct house.

An officer tells them, "You're each allowed to make one phone call."

Buff Mogul scratches one of his fresh sideburns while he talks to his attorney. Then he tells Tongue Fu, "Don't worry, my lawyer'll get us both out of here tonight."

"But I am allowed to make one phone call also."

Buff Mogul takes a card from the pocket of his mod jacket and passes it to Tongue Fu.

"Here," he says. "I have no idea where this came from. Why don't you try phoning and see what happens."

Tongue Fu looks at Chocolate Graham's calling card. Then he dials her number with the tip of his tongue.

5

A DATE WITH CHOCOLATE GRAHAM

It's Sunday morning, and Captain Mediafreak is busy

baking hash oil cookies to eat during the telecast of a football game.

"You have a blind date," he is saying to Tongue Fu, "that's what it sounds like to me."

"What is a blind date?"

"Well, first of all, a date is where you take a girl out to eat and to a movie and then you take 'er home and get laid. Traditionally speaking, that is. Of course, that doesn't apply to you because you've taken this vow of celibacy."

"I do not ever take a vow."

"Well, anyway, a blind date is where you've never seen each other before."

That afternoon, the first thing Tongue Fu says to Chocolate Graham is, "Would you like a hash oil cookie?"

"How do you know I'm not a narcotics agent?"

"I do not know. You did not say on the telephone."

"Let me put it this way: How do I know you're not a narcotics agent?"

"I am not."

"Never mind, I'm just teasing. If the narcs are this subtle, I'll join 'em. Come on in."

A couple-dozen folks of all ages are seated on cushions in her living room. When Tongue Fu gets comfortable, she begins to address the group....

Flashiebackie:

Say When Daddy is presenting young Tongue Fu with a personalized volume of the *I Ching.*

"Keep this with you always, Anteater, and consult it for guidance whenever you are in doubt."

"But how can a book know anything about my activities?"

"Open it," the old man grins, "and it will open you."

Tongue Fu accepts the book and opens it. Instead of there being pages inside, up springs an Oriental jack-in-the-box holding a placard on a stick, bearing this message in caligraphy:

THERE IS ONLY NOW–
AND THAT IS ALREADY GONE

"I vow to remember this message."

"No, Anteater, to make a vow is to not live in the present. It is to postpone your strength. You must develop your strength, moment by moment."

He takes a handful of marbles from his pocket and slowly tosses them, one after another, into the air toward young Tongue Fu, who in turn catches each marble by balancing it on the end of his tongue, which darts up with amazing accuracy.

"Ah, Anteater, how many hearts will you break with that tongue of yours? Cunnilingus would never be the same."

"I do not wish to hurt anyone. I shall abstain from such gratification of the flesh."

"So soon you are trying to live in the future."

"You are correct. I will take no more vows."

"Do you know, Anteater, what is the sound of one hand clapping?"

"Is there a correct answer to such a question?"

"Do not attempt to find it yet. Some day you will meet your mother and you will learn why it is that only through the grace of hundreds of thousands of dead souls do you experience the ecstacy of existence. That's the way the satori bounces...."

"All right, now, just to conclude my rap before I answer your questions," Chocolate Graham is saying, "I ought to explain what the CRAP Test is. The initials stand for Coincidence Rationalization and Practice. That's my working philosophy.

"It's one thing to accept the myriad of coincidences that started governing your life before you were even born– how our parents met, how their parents met, and then the inconceivable coincidence of a specific spermatozoa and ovum uniting to culminate in each of us– but it's another thing to set about deliberately arranging coincidences.

"Everyone of you is here today because of the coincidence of time and space which allowed me to slip you my card. But then you screened yourselves in as a function of your own curiosity.

"Now, I've read ten thousand books– I'm not exaggerating; if a footnote turned me on, I would seek out the book it came from– and when I try to summarize all the wisdom I've synthestized, it boils down on one level to the arbitrariness of institutions, in every civilization.

"We, as humans, are the only species that wars with itself in so many ways, because we're the only species that can conceptualize our own destruction. Which means if enough of us change our own personal direction– by exercising our power of choice to the fullest extent– then alternative, positive institutions will evolve.

"Two years ago I used a portion of my trust fund to purchase a large chunk of land in Oregon, and this summer there, Camp Crap will be dedicated to the celebration of consciousness. Spiritual leaders from all over the world will participate on a continuing basis, but that's a mutual con game, because I believe we're all capable of spreading influence.

"Just how we go about doing that will be probed at individual meetings. The only cost will be the dime you've already spent to phone me in the first place. Okay. Are there any questions?"

The first question comes from the man who delivered her calling cards the previous day.

"What I'd like to know is, how do you know which people to give your cards to?"

"Yes, well, being a pygmy has been of great help. In this country, the mere sight of me indicates that I'm a member of three oppressed classes: I'm a little person; I'm a person of color; and I'm a person of the female persuasion. I am a triple invisible. And I have rolled with that actuality. So, to answer your question, the basis on which I choose people to give cards to is, essentially, I eavesdrop on their vibes."

6

TONGUE FU BECOMES A FELLOW TRAVELER

Captain Mediafreak and Tongue Fu decide to make a few extremely-low-budget film shorts.

On Monday, they shoot *Community Control,* following an ant carrying another ant on its back along the sidewalk, with a record of *He's Not Heavy, He's My Brother* serving as the soundtrack.

On Tuesday, they shoot *Counter Clockwise,* capturing a group of pre-teenagers on the Carousel in Central Park, passing around a joint as their painted horses slide up and down.

On Wednesday, they shoot *Energy Crisis,* immortalizing the sales pitch for a portable electric artificial vagina in a novelty items store.

The next day, Chocolate Graham keeps her appointment at the film partners' abandoned newsstand. She joins in on their cannabis-sharing rite while the TV news is on.

Walter Cronkite finishes delivering the weekly war dead statistics when Captain Mediafreak suddenly snaps his fingers and says, "It's the body count– today must be Thursday– who wants to take some acid with me?"

All three swallow their LSD tablets with the aid of peach-flavored kefir, while Eric Sevareid gives his official opinion of an upcoming space mission.

"I could do news analysis," Captain Mediafreak says. "Look, they don't even show his body. They could just place me right on top of the table."

"With all the television you watch," Chocolate Graham asks, "what's the most significant pattern you've observed?"

"I'd say" —Captain Mediafreak ponders her question— "the tendency to divide people of different backgrounds in the guise of bringing them together."

"But what about the infiltration of counter-values?"

"It's pretty schizoid. Susan St. James'll go on the Merv Griffin show and talk about the importance of being a vegetarian, but then she'll be on *McMillan and Wife* and order a steak dinner. Or Blythe Danner'll tell a *TV Guide* interviewer that she doesn't wear any makeup, but then she'll wear makeup on *Adam's Rib,* which ironically is supposed to be about a liberated woman."

"And, finally," Walter Cronkite is saying, "CBS learned today that the late Judy Garland had a clause in her will requesting that the makeup man from *Green Acres* be hired to apply the cosmetics to her face while her body lies in state. In Hollywood, however, Eva Gabor, star of the situation comedy, refused to grant him a leave of absence. And that's the way it is."

"And that is the way it is," repeats Tongue Fu.

He takes out his kazoo and evokes from it a calming falsetto melody.

Chocolate Graham listens for a while, then says: "Only an ordained Patoonga priest could play a kazoo like that. May I see your bellybutton?"

Tongue Fu takes off his shirt.

Chocolate Graham stares at his bellybutton, which stares unceasingly back at her....

Flashiebackie:

Luke Warm Sake is tattooing a third eye on the bellybutton of post-adolescent Tongue Fu, whose shaved head is betrayed by a five o'clock shadow.

"Ah, yes, Anteater, bellybuttons are what we all have in common, yet no two are alike, as with snowflakes and fingerprints. Bellybuttons are my specialty, but once I tattooed everything from a ladybug on a lady's thigh to a pornographic mural on a gentleman's entire body.

"During the war I was taken prisoner and coerced into decorating the bodies of my captors. One officer insisted that I perform a tattoo on the space between his lips and nose. I had to be extremely careful with the needle. He forced me to inscribe 'Fuck the Japs' there above his upper lip. Perhaps he has grown a mustache.

"There we are, Anteater, all finished. As a Potoonga priest, I have rendered you separate but equal. That did not hurt as much as your anticipation, did it? Remember to contemplate the illusion of pain, and it will disappear as easily as removing lint from your third eye...."

Chocolate Graham is dancing to the beat of Aretha Franklin singing *Respect.*

When the record ends, she asks Tongue Fu, "Shall I show you what the sound of one hand clapping is?"

With an intensely gradual approach, she moves her right hand until it comes to rest on his left cheek. He does the same. Then their hands glide into a spontaneous hugging. They bring Captain Mediafreak into their embrace. It is he who breaks the silence.

"You'll hafta excuse me now, I've gotta watch the Waltons."

Tongue Fu seems perplexed. "Am I not supposed to follow the Waltons?"

"I checked the schedule. Your summer replacement starts tonight."

Chocolate Graham is removing her clothes. Tongue Fu does likewise.

And then, with neither one speaking a word, they begin to make love, each touch emanating from such total attention that it all appears to be happening in exquisite slow motion.

As Captain Mediafreak watches the Waltons finding joy in the depression, Tongue Fu is going down on Chocolate Graham, and she is going up on him.

Now she is astride him, their genitals mingling in a maze of colors.

"There is only now," he struggles to say, as if to avoid becoming lost in the mounting tension, but his psyche yields to her uninhibited spasms with his own inevitable ejaculation, so that he can barely whisper in the soft afterglow, "and that's already gone."

Tongue Fu has had his first contraction.

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(To be continued in Summer issue.)

CoEvolution and the Biology of Communities

BY PAUL R. EHRLICH
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Paul Ehrlich, author of **The Population Bomb**, *supervised my tarantula "research" at Stanford in 1959. Unknown to most of his fans, the doom buffs, Paul is basically a butterfly freak– though recently his kink for bright colors has lured him into scuba-diving with schools of tropical fish in the Caribbean ("like flying through the levels of a tropical rain forest"). He is a population biologist primarily, an environmental prophet secondarily– albeit one of the best. ("I'm a pessimist and you're an optimist. That's why I'm always right and you're always wrong. Naw." –he told me as I signed up to participate in his CoEvolution course this spring.)*
The paper here was an introduction to a symposium at the 29th Annual Biology Colloquium, 1968, whose proceedings were published as **Biochemical Coevolution**, *edited by Kenton L. Chambers. This paper of Paul's is the best scan of CoEvolutionary ideas I've seen. And it sounds like Paul talking, that is, like Walter Winchell.*

–SB

In recent years ecologists have been focusing more and more attention on the properties of communities of organisms. There has been a renaissance of what we used to call "synecology," and several new schools of community ecologists have emerged. One school has focused its interests on the concepts of niche, species diversity, and related topics. Members of this school often deal with questions such as: "Why are there more species of lizards on island X than on island Y?"; "What simple environmental measures can I use to predict the number of bird species in a grassland?"; or "What limits the similarity of sympatric species?" Another approach to communities which has gained prominence recently is a holistic-mathematical approach. Many measurements are made of a complex ecological system. Then the analytic and simulation techniques of systems analysis are used to identify important variables and predict future states of the system.

This colloquium deals with another new way of looking at the properties of communities. This way consists of examining the patterns of interaction not in an entire community but between two groups of organisms, groups which do not exchange genetic information but which do have a close and evident ecological relationship. Peter Raven and the author (1965) called the evolutionary interactions within such systems "coevolution" in order to emphasize the reciprocal nature of the relationship. This reciprocity is abundantly evident in the butterfly-plant systems which we investigated and in herbivore-plant systems in general.

PLANTS AND HERBIVORES

Many of the characteristics of plants, such as spines, pubescence, nutrient-poor sap, and so-called "secondary plant substances" have evolved in larg part in response to selection pressures created by herbivores. The chemicals seem to be especially important, serving as both repellents and pesticides. Herbivores, on the other hand, have responded to the defenses of plants in diverse ways. Many obviously have adopted detoxifying systems to deal with the noxious compounds produced by the plants. For instance the plant *Lotus corniculatus* occurs in populations polymorphic for the presence of cyanogenic glucosides (Ford, 1964). The plants containing the cyanogenic glucosides produce hydrogen cyanide when they are injured. Not surprisingly, these plants are much less bothered by herbivores than their noncyanogenic cohorts. Some herbivores, however, eat both kinds of plant with equal gusto. One of these is the blue butterfly *Polyommatus icarus.* Lane (1962) suggested that the larvae of the butterfly detoxify the cyanide by converting it into thiocyanate with the enzyme rhodanase.

Some insects have been so successful in dealing with plant poisons that they now recognize and are attracted to compounds which repel most herbivores. Indeed one "herbivore," *Homo sapiens,* consumes large quantities of plants because of the many uses he has found for "plant pesticides." He uses them in the role for which they evolved– as herbivore poisons (e.g., pyrethrum) and as herbivore intoxicants (various hallucinogens) and in roles unrelated to their original purpose (pepper, quinine, tobacco). Perhaps the best all-around response to plant defenses is found in aposematic organisms (those that advertise their defensive abilities by conspicuous patterns and coloration, such as the monarch butterfly). These organisms take up the plant chemical defenses and use them for their own protection. The monarch butterfly, for instance, is avoided by most birds because it contains vertebrate heart poisons. These poisons are obtained directly from the monarch's milkweed foodplants. Monarchs and similar organisms gain additional advantage from the avoidance of their foodplant by other herbivores (Reichstein et al., 1968).

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Photo: Leo Holub

Professor Ehrlich at work.

Many herbivores have adopted strategies to avoid plant defenses rather than overcome them. Some, for instance, may feed on parts of the plant which have relatively weak mechanical or chemical defenses. An example of this may be flower-feeding or pollen-feeding by many lycaenid butterflies, bees, and various beetles including scymnine coccinellids, dermestids, cantharids, and so forth. Other herbivores time their attacks carefully to avoid plant defenses. Paul Feeny (pers. comm.) reports that the larvae of the winter moth *Operophtera brumata* will not mature satisfactorily on oak leaves two weeks older than those on which the larvae normally feed. Larval development in nature is completed rapidly, early in the season before the tannins are laid down in the young oak leaves.

Plant-herbivore coevolutionary systems usually involve "selectional races." Strong selection pressure is put on plant populations by herbivores, and any improvement in plant defenses is at a selective premium. Herbivores, in response, must find ways of dealing with the plant defenses or they will starve. The tightness of the situation is exemplified by the winter moth case described by Feeny. The timing mechanism of the moths must be extremely precise to guarantee that the larvae hatch just as the young leaves are appearing. If they hatch too early, they starve before the leaves appear; if they hatch too late, they are defeated by the tannins and other plant defenses. If the oaks can evolve ways of depositing tannins even earlier, or produce other defenses, the moths will lose the race, unless the moths can evolve a way of dealing with the oak's defenses.

Perhaps the most unusual coevolutionary system related to herbivory is that composed of swollen-thorn acacias and obligate acacia ants, brilliantly investigated by Janzen (1966). In this system, ants serve as substitutes for the usual defensive mechanisms of acacias. The ant acacias, for instance, lack the bitter-tasting chemicals which are characteristic of other acacias. The ants live in the swollen thorns of the acacias and feed on specially modified leaf tips. If the ants are removed, the acacias are killed by herbivorous insects. As long as the ant colony persists, the ants attack the herbivores and keep them from eating the acacias; the ants also destroy plant competitors of the acacias.

PREDATOR-PREY RELATIONSHIPS

A coevolutionary system which is the homologue of the plant-herbivore system is the predator-prey system. Like the plant-herbivore system it, in essence, is a selectional race. The prey is selected for predator-avoidance and in the predator for prey-finding. This system is much more familiar to us than the plant-herbivore system; for some strange reason most biologists seem to have the impression

that plants just sit around defenseless, waiting to be devoured! All biologists, however, are familiar with the sharp senses and speed of the antelope, the stealth and fangs of the tiger, the spines of the porcupine, and the eyes and talons of the hawk. This is hardly the place to go into the vast literature on this subject, but I do want to point out that the relationship between predator and prey is all too often viewed as static, in spite of the evolutionary work done on *Biston, Cepaea, Natrix,* and mimetic assemblages. There is every reason to believe that most prey species are continually "evolving away" from their predators, and that the predators are either trying to catch up or get ahead. Extinction may very often be the result of a "win" by either side.

In investigating predator-prey systems, most of the emphasis has been placed on the nature and evolution of devices used by prey to avoid being eaten. There is, of course, a vast literature on protective coloration in both vertebrates and invertebrates. An equally impressive literature is accumulating on biochemical defense mechanisms in arthropods as a result of the work of Thomas Eisner and his associates (e.g., Eisner and Meinwald, 1966). Although some research has been done on predator behavior— such as the classic work on orientation in bats by Griffin— much less work has focused on this side of the relationship. Recently, however, there has been an upsurge of interest in the functioning of predators in general, due in particular to the work of Holling (e.g., 1966) in analyzing the components of predation. Once we understand predation more thoroughly, it should be far easier to investigate the reciprocal aspects of predator-prey systems. Perhaps those most amenable to analysis would be systems involving parasitoid wasp predators and their insect prey. Various components of attack and defense have been analyzed in these systems, but to my knowledge none of them have been approached from a coevolutionary standpoint.

PARASITE-HOST SYSTEMS

Parasite-host systems are similar to predator-prey systems in that one would expect a continuous selectional "race" between host and parasite. The race would be somewhat different, however. It is advantageous for the host, like the prey, to "escape." But, it is not advantageous for the parasite to kill its host, while killing is advantageous for the predator. The counter argument, that it is not advantageous for a predator to eat too many of its prey either, will not hold water. In the vast majority of cases, we must assume that group selection is not operating and that predators which are effective killers leave more offspring than those which are not. There is anecdotal evidence that individual predators may kill far beyond their individual needs for consumption. More importantly, there is no known evidence that any predatory species except man does not feed to repletion, given the opportunity. Conservation of prey resources, if it occurs, is not through the exercise of altruistic restraint by individual predators. With most parasites, however, restraint is not altruistic. Reproductive or feeding behavior which results in the death of the host all too often results in the death of the parasite as well. The problem of the parasite, then, is somewhat more difficult than that of the predator. It must often take care that it does not overtax its resources— for the individuals which do overtax leave fewer offspring than those which do not.

Host-parasite relationships have been studied evolutionarily in some instances, although the evolutionary response has usually been studied one side at a time. Some of the most widely known examples of evolutionary responses involve man: hemoglobin responses to malaria and thalassemia as a host response and the development of drug-resistant bacteria as a parasite response. One host-parasite system is now being studied extensively from both sides by Dr. J.H. Camin and his associates at the University of Kansas. Working with rabbits and rabbit ticks (*Haemaphysalis leporis-palustris*), they have been able to demonstrate an immunity to tick attack developing in the rabbits. Ticks that get on a rabbit after others are already feeding either cannot attach or can take much less blood. Therefore, they produce fewer eggs or none at all. Immunity is temporary, only lasting 10 to 20 days if it is not challenged. The ticks show a circadian rhythm in dropping off the rabbits which causes the ticks to concentrate in rabbit warrens and tends to synchronize the life cycles of the individual ticks. They, therefore, get on the rabbit en masse, rather than a few at a time. Many other aspects of the rabbit-tick system are under investigation by the Camin group now, including the fascinating question of why the rabbits have not evolved a long-term immunity. The circadian rhythm of the ticks is, by the way, relatively independent of the rabbit physiology (entrained by photoperiod), which makes an interesting contrast with the European rabbit flea in which the reproduction of the flea and its transfer from the adult rabbit to the young rabbits is controlled by the hormonal changes in the pregnant female rabbit (Rothschild, 1965).

Many other evolutionary responses have been inferred in connection with host-parasite systems, usually as "adaptations" of the parasite to the host and host responses (of which various immune reactions are the outstanding examples). The intimate relationship between parasites and the hosts which we consider to be "vectors" have also received considerable attention, but little evolutionary study. We know that vectors and vectored tend to occur together at the right time and place, but we do not know in most cases what kinds of selective pressures each places on the other. For instance, are *Wuchereria* populations and mosquito populations engaged in a perpetual dance in which a constant disruptive selection pressure occurs in both populations? Microfilariae tend to occur in the peripheral blood at the time that the mosquito

vector is feeding. Presumably the earliest and latest mosquitoes have the smallest chance of picking up the parasites. This could lead eventually to a polymorphism of feeding times in the mosquito population, followed by a similar response in the parasite. Or other selection pressures may make either early or late feeding hazardous, so that directional selection would operate on feeding time. Or, other selective factors may override the effects of parasite infection and maintain a rather rigid mosquito feeding time.

Even in the situations where we have some idea of the evolutionary dynamics, as in the case of sickle-cell anemia in man, we have not been able to examine the entire pattern of coevolution. For instance, although we know that hemoglobin S gives considerable protection against *Plasmodium,* we do not know the entire mechanism of protection or the exact kinds of selection pressures to which the parasites are subjected. The glutamic acid-valine residue substitution which changes hemoglobin A to hemoglobin S results in a 50-fold increase in the viscosity of the hemoglobin. The phagotrophic feeding of the *Plasmodium* is inhibited, as the formation of food vacuoles becomes difficult. Changes occur in the surface of infected erythrocytes, making it possible for the liver to recognize them and remove them. The malaria parasite might evade this defense by evolving a new feeding strategy, perhaps by developing an enzyme to reduce hemoglobin viscosity. Whether there is any trend in this direction is unknown. To my knowledge, there has not been an attempt to compare features of strains of, say, *Plasmodium falciparum,* from areas of high and low Hb^S frequency.

MIMICRY

Closely paralleling the host-parasite case would be the coevolutionary interactions involved in Batesian mimicry. The mimic, of course, plays the role of the parasite. Its strategy is to take advantage of the model without destroying it. The model gains nothing– and faces the danger of a "credibility gap" developing in its potential predators. For at some point, if the mimics get too common, most predators will associate only happy experiences with what originally was an aposematic pattern in the model. Such a development, of course, ruins the game for both players. One would expect that the model would evolve away from the mimic at a maximum rate, everything else being equal. It is to the mimic's advantage to maintain a maximum of resemblance to the model, until that critical point mentioned above is reached. Then the advantage becomes a disadvantage– the mimic is conspicuously patterned, but predators now associate that pattern with tastefulness. As a result, selection would tend to move the mimic away from the model into a more cryptic pattern. It is not inconceivable that imperfect resemblances, now attributed to mimicry in the process of being perfected, are quite the opposite. They may represent mimics moving away from the model or mimics in an equilibrium situation between perfect mimicry and cryptic coloration. Development of a polymorphism in which one or more forms are nonmimetic may also be the result of such a reversal of the selective situation.

As Ehrlich and Raven (1965) pointed out, there is no sharp line between Batesian and Mullerian mimicry. [In Batesian mimicry a palatable species resembles an unpalatable one (the model); in Mullerian mimicry, two different unpalatable species resemble each other.] In all cases it obviously is of advantage to the Batesian mimic to become distasteful if it is physiologically possible to do so. In butterflies, at least, it appears that the usual source of noxious compounds is plant biochemicals, so that foodplant relationships must play a large role in the evolutionary dynamics of any given situation. A butterfly has several different routes to obnoxiousness open to it. If it occurs on a foodplant which does not produce an appropriate compound, it may switch foodplants. If it is feeding on a plant with an appropriate compound or its precursors, the butterfly may evolve the ability to use the compound or synthesize a noxious compound from precursors. Finally the foodplant of the butterfly may evolve an appropriate compound, which then may be picked up by the butterfly. In the latter case the mimetic butterfly would be involved in a complex of "selectional races" involving the model, the foodplant, and predators. As the foodplant becomes more and more obnoxious, the butterfly must find ways of "breaking even" by avoiding poisoning or "winning" by turning the poison to its own advantage. Predators may simultaneously be undergoing selection for ability to discriminate between model and mimic, and for "resistance" to the obnoxious properties of the model. Of course the presence or strength of such selection will depend on many variables. For instance, in some cases butterflies in a single population may make up such a small proportion of the targets of a single predator that selective influence on the predator will be negligible.

In many ways mimetic assemblages make ideal subjects for the study of coevolution– as has been amply demonstrated by the Browers, Phillip Sheppard, and others. We understand a great deal about them, and yet there are many questions unanswered. For instance, detailed studies of putative Mullerian complexes are needed to answer a variety of questions. One would expect that the various members of the complex would have different effects on predators since they presumably are picking up poisons from different sources. As an example, one Mullerian butterfly complex consists of a *Lycorea* species, presumably feeding on Asclepiadacae or Apocynaceae, several Ithomiines on Solanaceae, two *Heliconius* on Passifloraceae, and a *Perrhybris* with an unknown foodplant. Ideally, of course, each member of the complex would give strong and similar reinforcement

to all local predators, so that multivalent noxiousness might evolve in various members. It would be particularly interesting if biochemical mimicry could be detected in some of these organisms— that is, two quite different chemical compounds obviously selected to give similar effects in the same predator. Rothschild (1961) has suggested that this occurs with defensive odors.

Although it is clear that, in general, Batesian complexes should evolve toward Mullerian complexes, the fate of Mullerian complexes is less obvious. It would probably be unwise to think of them as stable "end points" of evolutionary sequences. If this were the case, one might picture all of the diurnal Lepidoptera (and perhaps many other herbivores and small predators) in an area eventually being recruited into one large complex. It would really save the memories of the birds, but the birds would not have to remember for long because they would starve to death. Obviously, the larger a Mullerian complex gets, and the more similar the defenses of its members become, the more "profit" accrues to a predator which devises a way of consuming the Mullerian mimics. Thus a large selective premium is placed on a strong stomach, and one would expect predators evolving rapidly to deal with the entire complex. If this happens, the advantages of belonging are reduced and one might expect the complex to break up.

PLANTS AND POLLINATORS

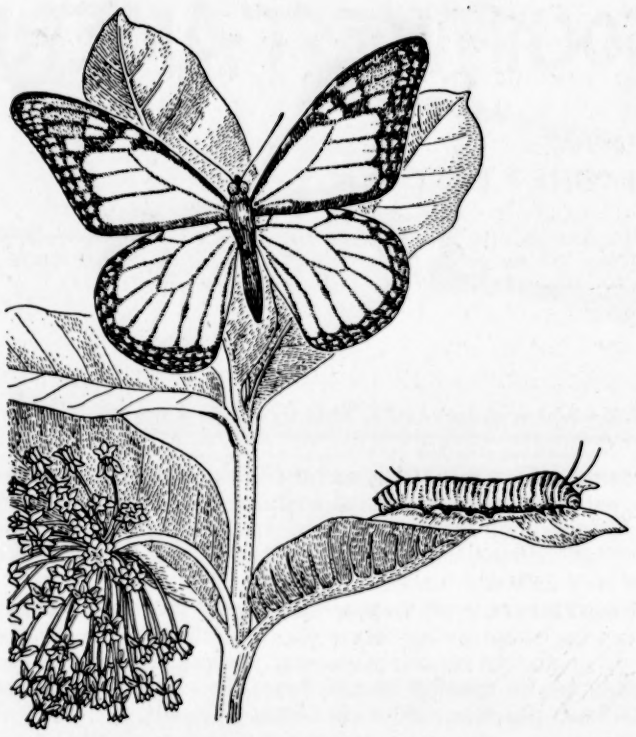
Mullerian mimicry is one good example of mutualism. There are many others, many of which doubtless would provide good materials for coevolutionary studies. Perhaps the most widely studied mutualistic coevolutionary system is that of flowering plants and their pollinators. Relationships in this system range from extremely close and clearly reciprocal to casual and possibly unidirectional. Best known of the "tight" relationships are those of the yucca and the yucca moth and of the fig and the fig wasp. In the latter case, both insect and plant are totally dependent on one another— the relationship is obligate in both directions. A wide variety of intimacy has been revealed in the relationships of bees and Onagraceae by the elegant investigations of Linsley, MacSwain, and Raven (1963). A large number of bee species visiting *Oenothera* were found to be oligolectic, collecting pollen for their larval cells exclusively from plants of that genus. Many others, however, were polylectic, collecting pollen from *Oenothera* and from plants of other genera and families. The tightest relationship discovered was that of the bee *Andrena rozeni* and *Camissonia claviformis.* The plant, which has a flower well suited for bee pollination, presents its pollen and nectar in the late afternoon (it is presumably derived from a morning-opening species). *Andrena rozeni* only gathers pollen in the late afternoon, even though residual pollen is available early in the morning. The mouthparts of *A. rozeni* are elongated, permitting it to extract both nectar and pollen simultaneously, and these are very rarely taken from other plants. Mating likewise takes place at the flowers of *Camissonia claviformis,* the males cruising over them before the first appearance of the females. Of course, many pollination systems have been studied from the point of view of floral morphology, color, and odor in relation to attracting the proper pollinators: long corolla tubes for hawkmoths, red color for hummingbirds, huge widemouthed nocturnal flowers for bats, chemical attractants in orchids, orchids shaped as females to lure male insects, and so forth. It is not clear in most cases, however, what evolutionary responses in pollinators have been elicited by the vast smorgasbord with which they are presented. It would be a mistake to assume that the response has not been considerable, if subtle. It behooves a pollinator to get the job of feeding done with as little energy and risk as possible. Each pollinator is presumably programmed genetically to respond to a "proper" series of stimuli— an exact odor, shade of color, or shape, or a series of odors, colors, or shapes. Each pollinator has adopted a strategy— in essence specialist or generalist. Similarly, each plant has adopted a strategy. As floras and faunas evolve together, the utilities of the various strategies are going to change. The specialist pollinator may find its food source becoming too rare, or the generalist pollinator may find the competition too stiff at many of its sources. Conversely, the specialist plant may find its pollinator going extinct, or the generalist plant may find it is not getting enough accurate transport. The end result of any of these anthropomorphized possibilities is a choice of "evolve or go extinct." When the behavior patterns of pollinators are more thoroughly understood, we shall appreciate more fully the reciprocal nature of most pollination systems.

COEVOLUTIONARY COMPLEXES AND COMMUNITY STUDIES

It seems appropriate now to discontinue the survey of coevolutionary complexes and return briefly to the question of the consequences of their study for community biology in general. Community biology is concerned with the composition of communities and the dynamics of that composition. Community composition is, in part, determined by physical tolerance limits on the distribution of species. Determining the factors limiting distributions and the ways in which organisms "adapt" to the areas they occupy is the preoccupation of a branch of "physiological ecology." Someone once said that the usual conclusion of a study in this field is the determination that the organism can indeed live where it lives. The question of why those limits exist— that is, why the organisms have not transgressed those limits evolutionarily— is rarely investigated. In some cases the answers may lie in the relationship of the organism to its physical environment. For instance, many butterflies may not have penetrated temperate regions simply

because they have been unable to develop satisfactory diapause mechanisms. (This, of course, immediately raises the question of why some species have developed satisfactory mechanisms while others have not.) In other cases the answers probably lie in the area of coevolutionary interactions. The presence of a "winning predator" or the absence of a "beatable" foodplant may limit a herbivore. A model may be, in essence, "chased" by a mimic into an area which the mimic cannot penetrate (perhaps because of the distribution of its foodplant). We do know that mimetic species often extend their range beyond that of the model, ordinarily with a rapid loss of mimetic pattern. However, we do not know whether in any cases the mimetic species is restricted to the range of the model because of mimetic relationships.

Taking a coevolutionary approach to problems of community biology lessens the chance of being seduced into "explanations," such as "competition from X limited the distribution of Y." If the limitation of X is due to Y, then the two usually make up a coevolutionary system. In order to understand the limitation, it is necessary to understand the system. This means that questions about selection, such as were asked earlier, must be posed, and field and laboratory experiments must be carried out to find the answers.



Monarch butterfly and caterpillar on milkweed.

The Editor's Own Jelly

Two Cybernetic Frontiers
(Both Sides of the Necessary Paradox— Conversations with Gregory Bateson ... & ... Fanatic Life and Symbolic Death Among the Computer Bums)
Stewart Brand
1974; 96pp. (illus)

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Perspective

Eugene Schoenfeld, M.D. recently made this comment in his column in **The Pacific Sun.**

Several years ago Tiburon artist John Kyrk suggested a way to get a better look at what's really going on in our world. "Why not," John said one day, "have television cameras on stationary satellites facing Earth?" Each television set would have at least one channel featuring at all times— Earth. We're quite beautiful viewed from outer space. Space Lab astronauts at this moment see us all together floating through time, part of something knowable but yet unknown.

No better way has been suggested to get everyone centered. It's cheap, easy and would bring world-wide tranquility. How to gain perspective? Do it literally.

Energy does not explain

As an explanatory principle in the field of biology, energy rates a little better than money, but very little. And unless everything is filtered through information theory and information theory itself firmly grounded in circuits, most of what can be said is mush, and 30% of it is pathogenic. (Or is all mush pathogenic?)

Yours,

Gregory Bateson

FIELD NOTES

SOUTHWEST AMERICAN INDIAN MEDICINE

BY BRET BLOSSER

Mr. Blosser is a young anthropologist with unusual rapport. These are excerpts from recent field notes of his made with Hopi, Navaho, and Cahuilla informants. —SB

Field Notes, Sept. 1973, Moencopi, Arizona

When I was about 12 I was bit by a rattlesnake. I rode six miles home and they called a Snake Priest— medicine man who gave me herbs and treated me for a day and a night and part of the next night. Then he called in his side-kick to stay up with me. I pulled thru and it was felt that I was obliged to carry on his work in repayment for the saving of my life. I became his son in the medicine set-up. I had my mother and father but I was also his son. He began to teach me his medical knowledge. I learned mostly bones. And I know about all these herbs.

We would stay up all day just talking. He taught me the basics. For instance, when there are too many of a certain kind of animal, then something happens so that their number is reduced. This was part of the medical knowledge that he taught me. These things didn't seem important to me then. Just like you and me, when we were taught arithmetic, we didn't think we needed it. Like a man who has had a bad experience with smoking might say "Son, don't smoke too much." That's all. Then later you realize how important it is.

Much of the practice is psychological. The Medicine man has to know both. You say "Where does it hurt?" "When did it start hurting?" You gain the patient's confidence. Then the conversation changes to other things and eventually the thing that really is the problem may come up. For instance, a man came to me and said that he got a pain in his neck and could not get to sleep. After a while he told me that he was jealous of his wife, that she might be cheating on him. I didn't act especially interested, but kept him talking. Eventually the name of the man came up. There is a Hopi custom that we call the women of our father's clan all "Aunt" and "girlfriend" no matter how old they are. We call them "Honey" even if their husbands are nearby. This is the fun of it. We are just teasing. One time some member of the patient's wife's clan had hit this man by accident, with some dishwater. When something like this happens, they give him a new name and do all the things they do for a newborn child. So this man was adopted by that clan and called those women, including the patient's wife, "girlfriend." (The patient had not known this.) It seemed that the man was getting the pain in his neck when he turned his head away from his wife to go to sleep. He was thinking that she was slipping out and cheating on him. I told him that I didn't think so and that I thought that that was the cause of the pain. A few days later he came back and said, "It seems to be falling in place the way you said." So a medicine man has to be both medical and psychological.

I never accept payment. The work I do is repayment for being cured. I will be repaying it for the rest of my life. I was taught that the medicine man can accept food, especially the old Indian foods. My teacher told me that this food is medicine to the medicine man. It makes him feel wanted. It makes him feel together with the people. I know all the herbs but I usually don't give them. You have to break White Man's laws to get them. (No trespassing where they grow.) You can't pick them without ritual. You must not take all. You must pick them where many grow so that enough are left to make more. Don't pick them where there is only one. We do the same with animals and birds. The old man taught me that you are taking the life from a plant and bringing it over to the man (patient), so the first thing is to respect nature (the plant). (He makes a motion of moving something from the left over his head to the right with both hands.) These things don't make sense at first, but if you think about them, after a while they do.

If a person picks the herbs who does not know the rituals, he may get sick.

It takes many years to become a medicine man. You are taught as you go along.

•

Field Notes, Oct. 1973, Lee's Ferry, Arizona

"Earth— pick some up, taste it. Yup, it's real."

•

Field Notes, April— May, 1971, Coachella Valley, California

Jes' song: I came there.
I stood there.
It moved Kalidescopically.
(Ruby: "Kalidescopically is an old word which isn't used much anymore.)

•

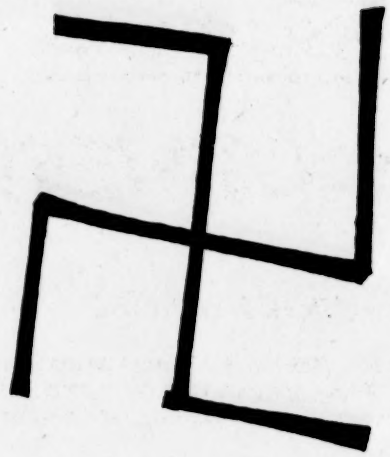
Takoosh Peak: Good and bad doctors go there and go inside. It quivers from Takoosh. Sometimes a fire of Takoosh appears on top. He lives in there, keeps the stolen spirit of a girl in there. Inside the walls are golden.

•

The epileptic attack is a sexual experience with the fits devil whom the person takes to be a real lover.

•

The Swastica means "from the East, from the North, from the West, from the South...Peace."



Ruby used to "go back" ten or fifteen dreams. She would dream that she was lying under a tree, she felt sleepy and went to sleep. In this sleep she would dream again and eventually, in that dream, go to sleep and dream again and so on up to ten or fifteen. There she would see weird trees and vines, ugly things. She would be wearing skins. Her uncle said these were dreams of how it was in the old days. Then she would think, I should go back, I am dreaming, and she would wake up from dream to dream. She can return from 3 dreams now and from 5 before, but needed her uncle to bring her back from ten or fifteen. He said Takoosh will get you out there and you won't come back this way. Doctors usually only go 3 dreams or 5 at the most. Ruby says not to practice this skill, just let it come. They find cures for cases in the third dream. Only strong witches go to the fifth dream. Beyond that one needs help to return. Uncle Charlie used to have to help Ruby return.

Ruby finds lost things by remembering where she was when she last had the thing just as she is falling asleep. Then she remembers where it is in her sleep.

•

Herbs in general: Pick all herbs as far from civilization (roads or trails included) as possible. They lose their power around men. Pick as high uphill as possible. Avoid flatland plants when hillside plants are available. Leave some for the next guy and for next year. Pick herbs with good thought, address Umna as pick. Wash herbs in clear water before using. As you clean them you must have good thought. Otherwise it will not work. Dry herbs such that air gets to all sides. (On porous cloth over a screen, turn once a day. Hanging. In a paper bag with holes in it, hanging, shake once a day.) (In an onion sack, hanging—Bret) Dry at room temperature is O.K. Some sunlight is O.K. Then break herbs off stems. Cook in enamal pot only. Not in metal (especially not in aluminum) pot. Use the pot for that herb only during the period of use. Let a pot sit three days before you use it for herbs if you've used it for cooking. Bury all herbs after use. About 1½ ft. deep. Bury in different places, not all together. Wrap Tunwivel in paper, bury with the folded side down. Don't take two herbs at once. Don't mix white man medicine and herbs.

•

Sweathouse herbs: Hungall (arroweed) or saltbush used in sweathouse. Mechewul used to sweat you for a slight cold. Peppertree bough and eucalyptus for colds. Boil pepper tree and eucalyptus together. Heat a rock outside. Climb under a blanket or tent. Drop hot rock in the herbwater and cause steam. Other herbs done the same way. You can sit on a low chair in the house over boiled herb water and drop a rock in.

•

Rattle: Cut off neck of plain dry gourd (ripe in Sept.) and cut hole in bottom. Shake buckshot or pebbles around in there until the loose seeds, etc. come out. Put a stick that fits thru to the hole in top. Shake with different pebbles until you get just the right sound. Then glue (in the old days used tar) the stick in. Bind the top and bottom with glue and buckskin, suede leather, or deer sinew. Paint (a bow; and an arrow for each deer killed, for instance) and put feathers, if you like, on the end. You can practice with a condensed milk can. Rattle handles should taper out so that it won't slip out of your hand. Hold with thumb and 2d from bottom finger and roll it around, giving it two shakes, in the top part of the hand.

•

The ocean is the tears of the animals who cried at the death of the Creator. It is alive.

•

To make Indian cheese: Open and salt and dry by hanging out a cow uterus. Put a little in an olla (bowl) of milk (fresh only). Next day its clabbery. Take out the uterus. Add the clabbery milk to a large amount of milk (6 gal.?). After a day, pour through a cheese cloth, discard whey, salt clabber, put in a sack under a board with a rock on top. It gets harder and flat. The cheese is good sliced and fried.

•

The Milky Way

Coyote was tired of always being beaten by Bobcat in everything. He challenged Bobcat to a race cause he knew he could win. He was the fastest runner around. The loser will give the winner all he's learned and all his powers. I know all you know, I won't do it— Bobcat
Oh, you're just backing out, you know I'm the fastest, —C
Well, O.K. —Bobcat
We'll run from ocean to ocean, dip tails and run back —C
(Coyote has the longer tail.) The race will be marked in the sky. The word gets around and many people show up at the starting line.

Coyote Zooms off thru the sky! He grins as he runs, looks over his shoulder as he runs, sees no sign of Bobcat. Then he sees Bobcat coming the other way. He races to the far ocean, dips his tail and heads back. Again he meets Bobcat coming from where he is headed. This happens on each of the three laps. Once Coyote gets off course and has to retrace his steps. This can be seen in the Milky Way which is the record of the race.

How did you beat me? —Coyote

Well I told you not to challenge me! —Bobcat

I know I can outrun him but how did he beat me? —Coyote

(Bobcat had arranged to have his relatives impersonate him at one end of the track, while he handled the other end.)

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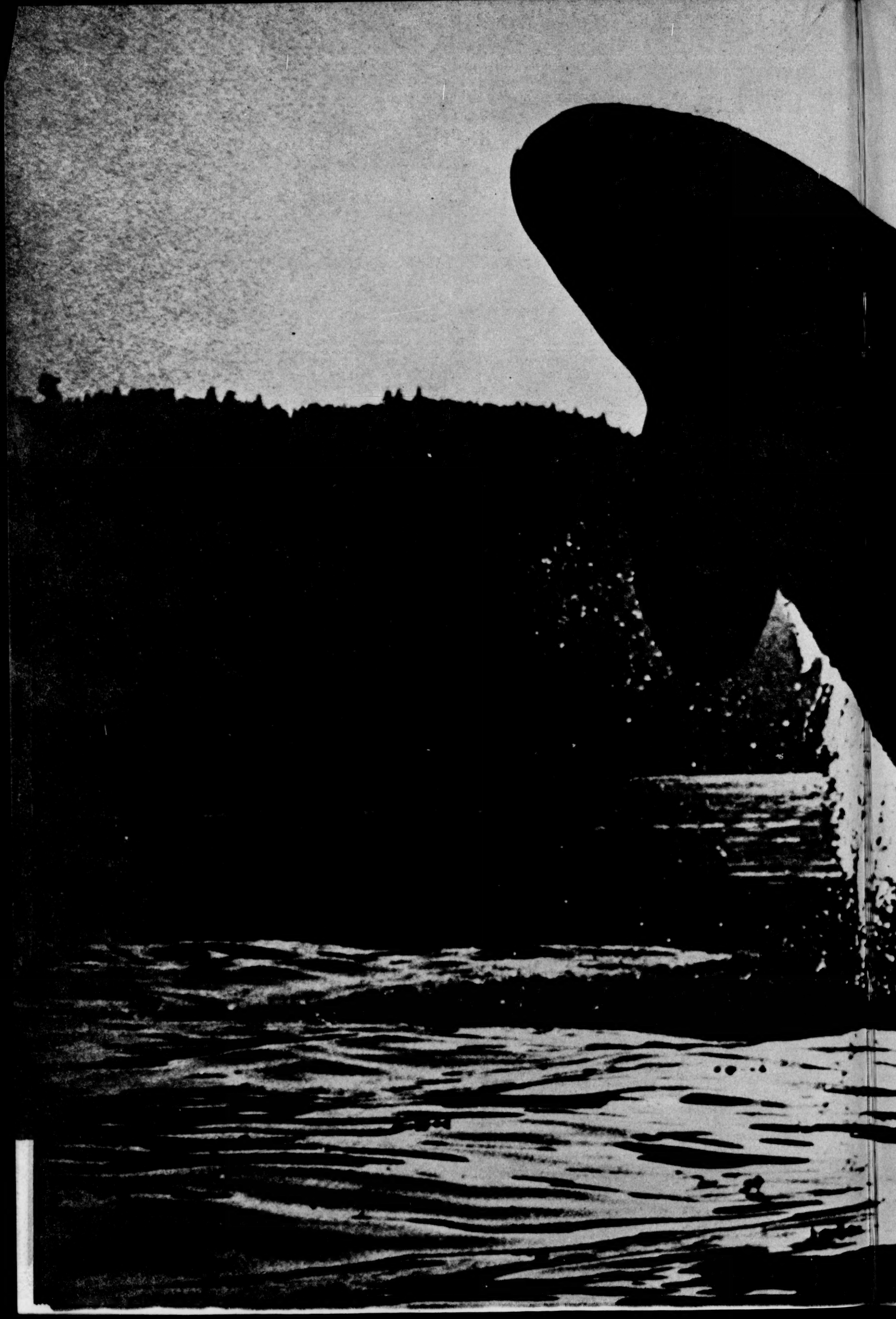
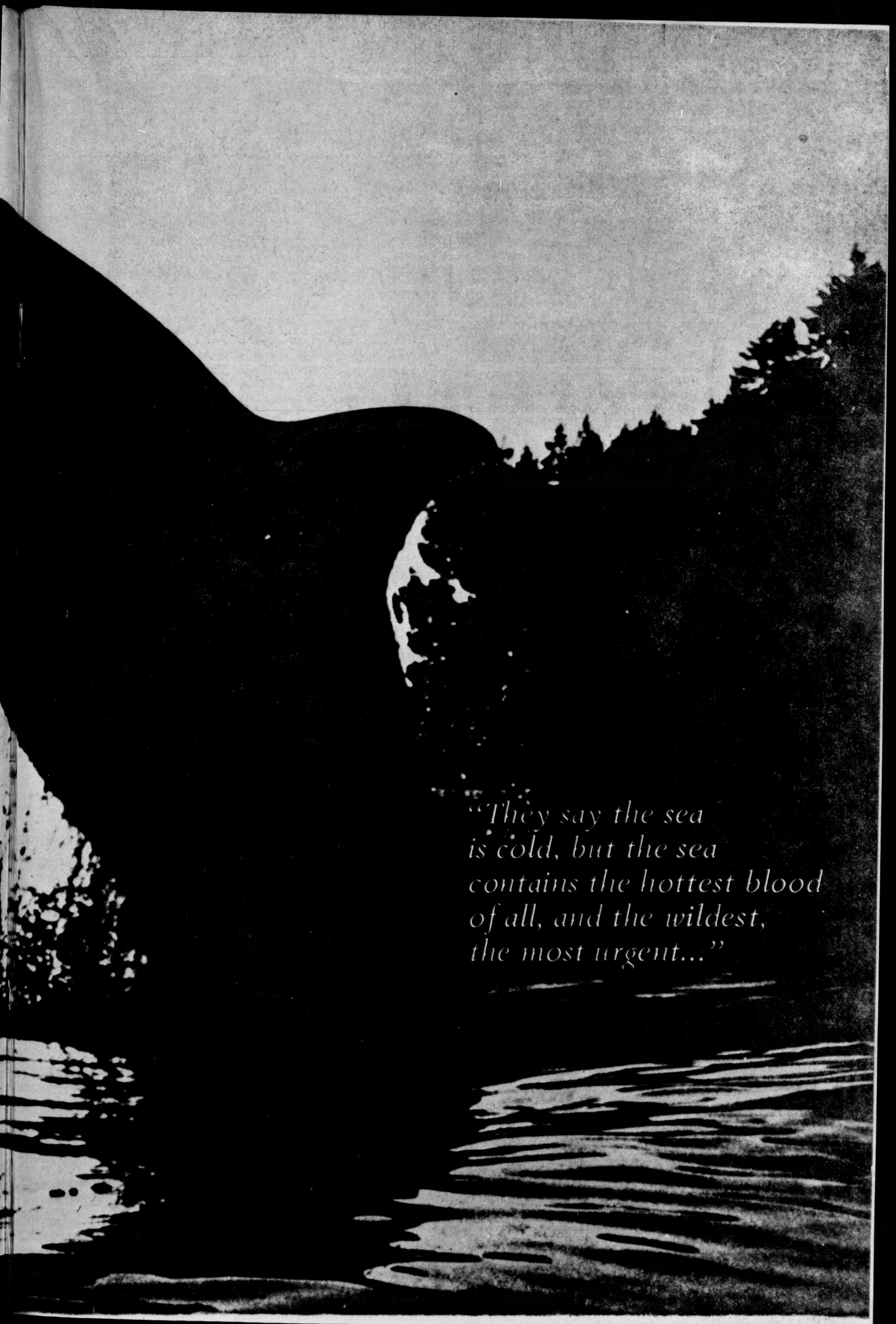



"They say the sea
is cold, but the sea
contains the hottest blood
of all, and the wildest,
the most urgent..."

"They say the sea is cold, but the sea contains the hottest blood of all, and the wildest, the most urgent..."

D.H. Lawrence, *Whales Weep Not.*

On preceeding page
A killer whale breeches in Puget Sound.
(Photo sent by Paul Spong)

Whatever the fine and intricate force that wove sea and cells together to produce great whales of the deep— whales that sing, that play, that court, love and nurse each other— whatever that ancient special chemistry of gentle change that produced great whales, it will never be duplicated in the lifetime of this planet. Once we allow the extinction of whales, we, and they, will never have another chance. And for what?

> lipstick, car wax, shoe polish, pet food,
> lubricating oil, margarine, pig feed...

The human being is carefully and methodically killing off the world's whales and dolphins. Of the twelve species of great whales of commercial value, the U.S. Department of the Interior lists eight in danger of extinction. The remaining four are not safe, for the pressure of the industry has shifted from the bigger whales to the smaller ones. They too will be so reduced in numbers that their survival will be moot. We carelessly kill hundreds of thousands of dolphins and porpoises in the normal operations of the tuna fishery and for pet food. We hunt and capture small whales and dolphins for exhibits and research.

In June 1972 the United Nations Conference on the Human Environment, meeting in Stockholm, voted overwhelmingly in favor of a ten year moratorium on all commercial hunting of all whales. The recommendation was referred to the International Whaling Commission, the agency charged with protecting the world's whales, which has for the last two years disregarded the UN's recommendations and set high quotas on fin, sei, sperm and minkie whales. The bulk of whale hunting is done by the USSR and Japan. Together they are responsible for about 83% of the annual kill. But the attention of the non-whaling nations has turned to the whales, and the issue of their slaughter is becoming an international one. If the world picture does not change, Japan, Russia and the other whaling nations have not much more than ten years of whaling before it is over. In ten years the ships and men will be idle, the seas depleted, and the whales will be gone. Sixty-five million years of evolution, of that special striving, will be finished in the next ten years.

—Joan McIntyre

SAVING WHALES & DOLPHINS

There's a number of things you can do

The most powerful force may be the voice of children. Project Jonah's International Children's Campaign to Save the Whales has a special school teaching kit available which says among other things:

> Please help save the whales before they are all gone. Thousands of children all over the world are helping. Write a letter, draw a picture, make a poem or story that tells how you feel. Address it to Mr. Tanaka of Japan and Mr. Kosygin of Russia. Next spring a few children from around the world will take your messages to Japan's and Russia's leaders and plead for the whales.
>
> Send your messages to Save the Whales, Project JONAH, Box 476, Bolinas, California 94924.

Since Japan and Russia are the offending nations, a boycott of Japanese and Soviet consumer products can be effective. For further information contact: Christine Stevens, Box 3650, Washington DC 20007 or Angela King, Friends of the Earth, 9 Poland St. London WC1, England.

The people who sailed ships into nuclear test zones in the Arctic and the French South Pacific are planning a "Project Ahab" to interfere with factory whaling in the Antarctic. Contact: George Dewez, Project JONAH, 15 rue de Commerce, Paris 15, France or The Greenpeace Foundation, 6591 Vine St., Vancouver 13, B.C., Canada.

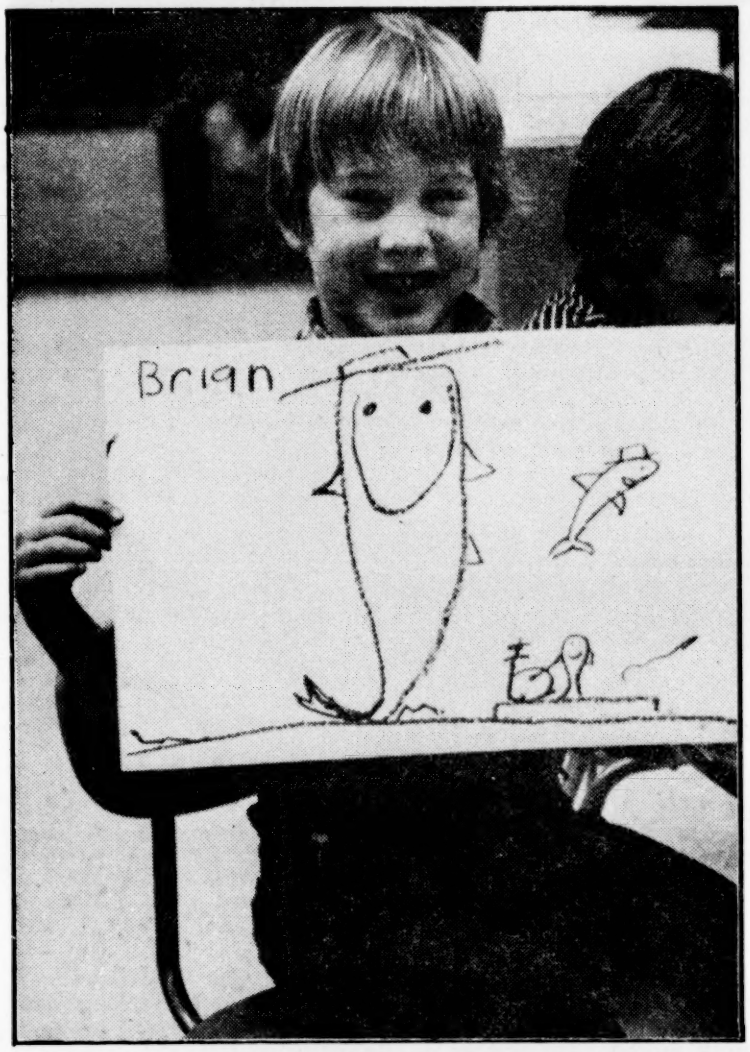
If you'd like to demonstrate in London at the time of the International Whaling Commission's meeting this June, contact Project JONAH (Bolinas address, above).

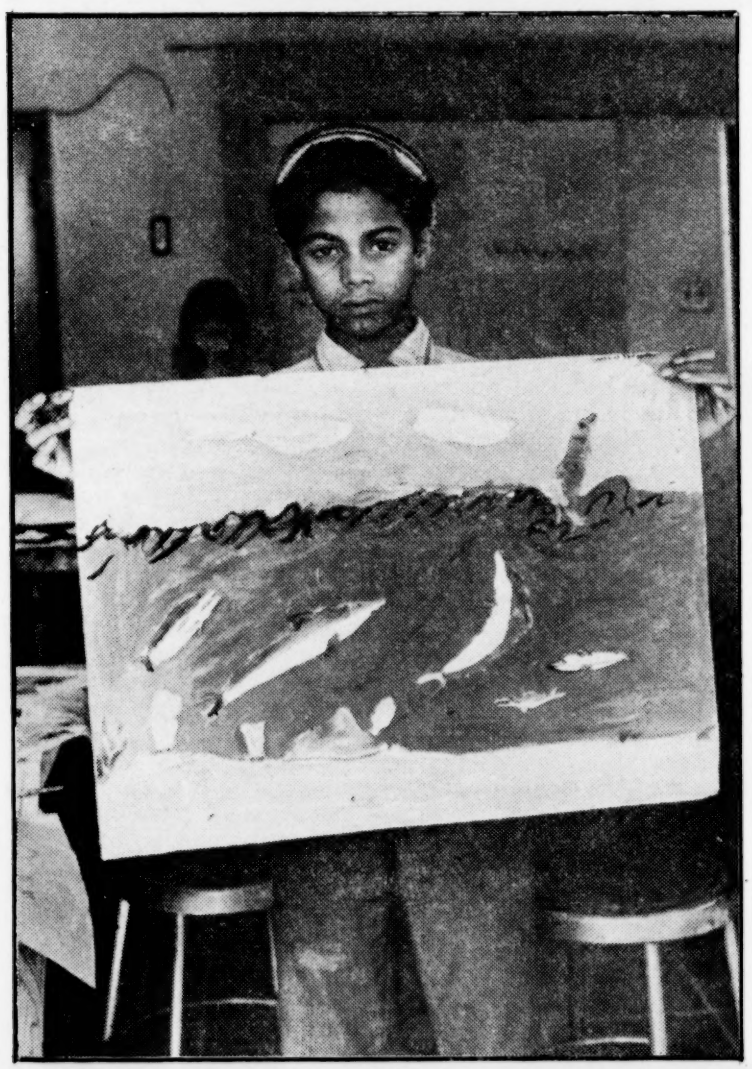
Japan is promoting an "Ocean Expo" in Okinawa for 1975. Says JONAH, "Letters and wires of protest to your government urging them to withdraw support from the Okinawa Expo until Japan tempers her fishing policies will be useful."

Thanks to recent innovations in tuna fishing, the tuna industry presently kills some 250,000 dolphins a year, for convenience. "You can do this: Write a tuna company. Tell them you don't want a public relations story, just an answer— When are they going to quit killing dolphins?"

POINT, the foundation with the money from sales of THE LAST WHOLE EARTH CATALOG, has donated over $20,000 to whale-saving, mostly through Joan McIntyre, founder of Project JONAH.

—SB





Work on the International Children's Campaign to Save the Whales. Photos by Ilka Hartmann.

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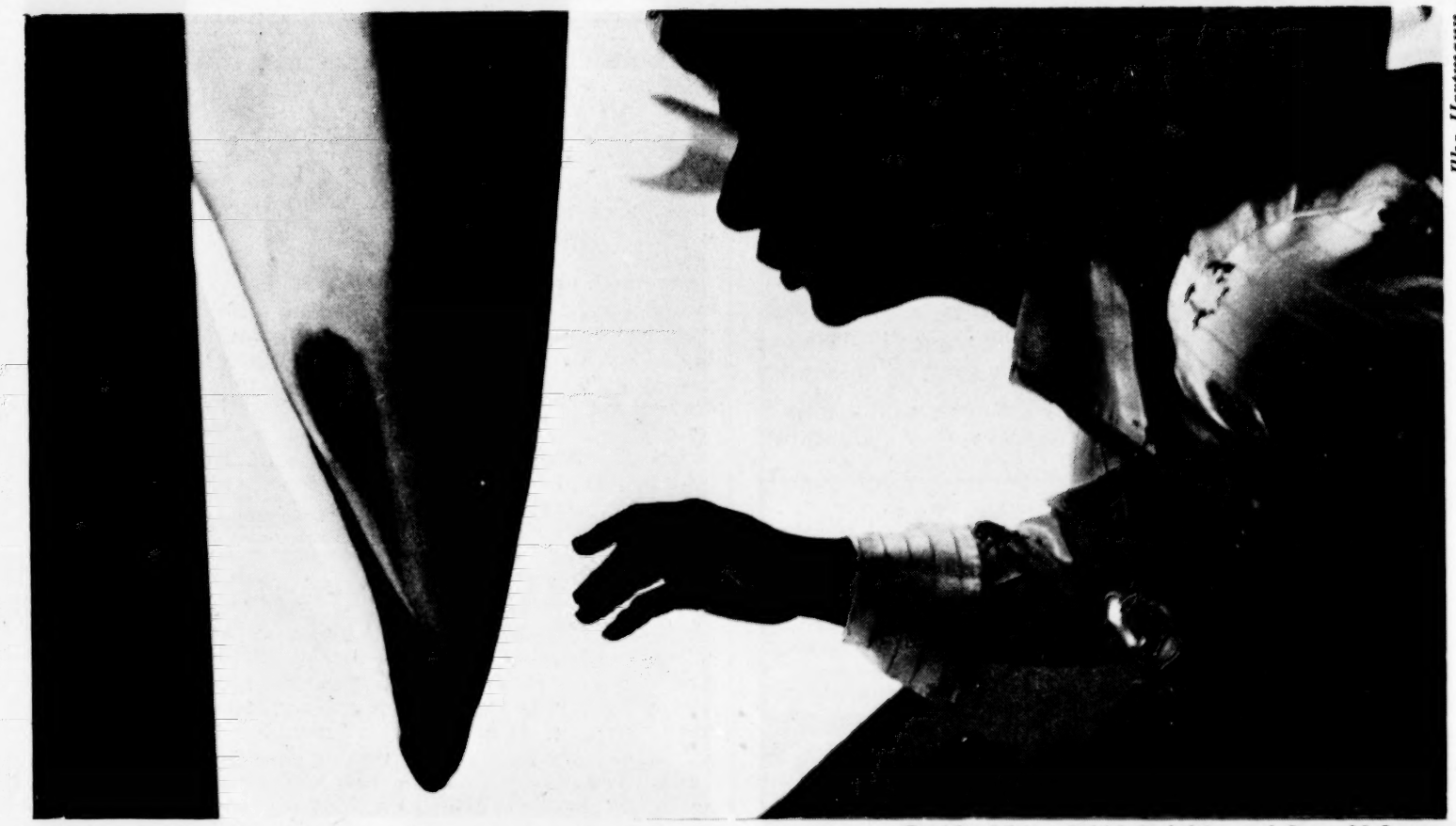

Ilka Hartmann

Pacific White Sided Dolphin and Joan McIntyre

MASHTA

BY JOAN MCINTYRE

This was the first great mansion in Key Biscayne. Fifty years ago the new-rich wife of a raw industralist tried to name her dream. She looked up words in books about other, more exotic, places; and found it– Mashta. Egyptian for the place of peace. A hurricane took down the house and the palms that had sheltered the lagoon. Now weeds grow out of the cracks in the tumbled seawall, and the bath house is a rubble of tile and mossy concrete. The weeds remind me of the capers I saw growing out of old walls in Malta, of the hot Mediterranean sun and sun-baked stucco. They remind me that this is a fake.

The sky turns dark bluish grey. A transcendent wound opens, and lightning cracks the horizon. Here on the lagoon it is dense and calm. Joan and Luis argue courtingly in the rubber boat. A cat stretches along the crumbling stucco wall. Are we in Mikos or Miami. The sea is the color of young grapes, the wall is the color of Phonecian paintings. This mansion has now fallen into placeless mystery.

We could be anywhere, this dark-haired Indian, this blond middle European. Babelonians, Incas mix, argue about dolphins. 2,000 years, one way or the other. What does it matter. We are arguing about the difference between us. It is still sex.

The dolphins spin out of the water in the shimmering light of the growing moon.

Swimming with them I lose track of what belongs to who. Is it Liberty, is it Florida. Am I being touched by male or female. Is it flukes or fins. Liberty uses his penis like a hook. Takes me behind the knee and tows me towards the rubber boat. I dip below the surface, stroke his– her– pink underbody. They twine around me, strong and powerful. It is a little scarey, this androgenous mixing below the surface. A dolphin floats by. I see its clear grey eye looking at me underwater. Is it he, is it her. I don't care. I only care that I cannot release myself to them. Cannot let go into the churning gentle malestrom of the contact of our bodies.

They press against me, drift whisper soft, then the confusion. Trying to keep my head above the water I lose both worlds. Am neither of the sea or of the land. Gulp breath like a dolphin and float, embryonic on the surface. I bob like a cork. My breath becomes particulate. Each bubble silvers, is distinct. I follow my breath to the surface, each bubble like holding onto a ladder. The last bubble is the end of it. Out of breath I rise and breathe. The dolphins rise a moment later, breathe simultaneously, and sink to flank me. I want their awareness. Do not know where to go to find it.

Hanging between the pontoons of the rubber boat the dolphins glide below me, their bodies in such perfect syncroncity that I weep with envy; lost my breath to the mind's beauty of it. Florida comes close, flicks me with her dorsal fin, a little hard. She wants me to reenter. I am suspended between my fear and my belief in them. Tear at the contents of my mind, worry myself with my imperfections, with my ideas. Then rest.

I sit crosslegged on the sea washed wall, just to the right of the crack, and look past the low wall on the other side to where the big signs in the water say RESTRICTED AREA, KEEP OUT. This is Nixon's house. Sometimes a stray sailboat is pursued by a helicopter with flashing red light and screaming siren. This is Nixon's house. Keep Out. The only other sign that says keep out is the sign in front of the dolphin project. No Trespassing. In the center of calm, in the center of power. These things are not for everyone.

Luis says the dolphins are becoming crazy. Too many people want to touch them. Too many people want to swim with them. Too much input, not enough of themselves, of their kind. They are becoming falsely dependent. It happens to all of us. The dolphins cannot cure us. They are captive. Two dolphins are not dolphins. Two is a human idea. A male and a female. Two. We impose it on them. We are trapped by the Ark, the nuclear family. Where is the tribe, the community, the group. Nixon lives next door. The disease spreads, venereal, of the mind. The dolphins leap in the half moon light, spin and splash. Propel

themselves out of the water and turn in the sky. It is too dark to see their pink bellies. The water closes over them without a sign, then breaks and opens to the rolling back.

At dinner in a fake Mandarin restaurant I look at the human life around me. Men and women hate each other, lose energy, tangle. It's crazy. Maybe we should just let it flow between our legs and be silent.

The anxious red-faced man who walked in here, who I mistrusted because of his heavy face and nervous air, has just come back in with his lady. She is large, too large, with a heavy face and shapless polka dot dress. He faces me across their table. I can see his face, the expanse of her polka dots. I am preoccupied with my sorrow, with our sorrow. Believe contact is impossible. Watch, as all around me couples pick at each other, trapped by their habits and their greed and fear.

The man has just given his lady a birthday present. He watches her face with suspended breath as she unwraps it. Watches her with the intense sweet smile of hopefulness. This heavy anxious man becomes beautiful before my eyes. I cry silently for at least this moment of their affection.

The people at the next table, the birthday people, are talking about Watergate. Did Mitchell lie? I think they are involved. They are talking about airplanes and getting away. We are only miles from Key Biscayne, my mind flashes on the dolphins framing the Keep Out Restricted Area signs. Their conversation is muffled and confused. I do not want to listen too closely, do not want to infect them with more fear if they are involved. I think of them as typical. As loving one another— yet not enough. Somewhere in the spaces of this monstrous evasion are the fleshy hands of men and women who loved one another; who protected friends, but who could not extend the circle of their affection far enough. Personal love is too selfish to save us.

This animal America, drying its wet feathers, an ancient tattered bird, in the late day sun. Is this despair chemical; political, experiential. I remember Luis declaring his passionate vision; a compound of love and hate, peasants with windmills and gardens, lands free from oppressors. I feel myself responsible, involved. Feel too American, yet knowing something about myself, about my country, that I need not defend. What are targets when radioactivity leaks out of the ground in Washington, and even the dolphin's splash cannot drive away the sorrow in Key Biscayne.

We can no longer afford the luxury of thinking that it is ok to blow up the rest of the world.

The dolphins play. They blow in short bursts, then float, dorsal fin up, back arched. They roll their bodies around an invisible center, arch and breathe, flatten and float, arch and breathe. The lagoon steadies and is calm. I become steady and calm watching them.

Florida has found a fish. She tosses it out of the water and catches it. Dives below the surface and comes up with the fish lying across her beak. Is the fish alive. I wonder if she is cruel. If she is playing with life. It matters to me if the fish is alive or dead. Tom asks if the fish has a red tail. The fish in these waters are becoming cancerous. Their tails are turning red. The red tail is a flag. The fish are clear and transparent and are marked by their blood red tails. The fish Florida has is dead, but it does not have a red tail. Tom and I are both reassured, each in our own requirement of order.

The dolphins circle together. Florida plays with her dead fish. Tom's daughter, Dee, is nine years old. She is restless. She catches lizards to throw to the fish. She is young, like the dolphins. Throwing the lizards in the water bothers me. I watch them struggling in the sandy light, am angry at Dee for her cruelty. Are the dolphins cruel. Do they, unseen, just below the murky surface, play capriciously with life to see what it will do. Do they, without thinking, kill for the fun of it.

The dolphins are a mirror. Sliding into the water with them is like sliding into our own reflections. Their intense awareness sends back a clear image of our nature at the moment of our contact with them. They read us in the present. We cannot lie to them.

As children we used to play mimic games where we sat before another child and pretended we were mirror images; washing our faces, sticking out our tongues, making funny faces. There was always a slight lag, a moment when it took the other to recognize the gesture and duplicate it. We were reading and interpreting and reacting. The dolphins seem to do it instantly. They seem perfectly to reflect one another, move as a single animal. There is no lag in recognition. I am awed by this quality, cannot even begin to understand how they communicate, the nature of their mutual awareness.

Luis believes that sexual contact pollutes the dolphins. He also believes it pollutes him. He is afraid of touching, afraid of turning them into human sexual junkies. He seems to be afraid of that happening to him. Annsophie is not afraid. She is gentle with them and they are gentle with her. Annsophie is not afraid of contact; desires it, walks forward into it. I test myself, am tentative, but try to trust them. They are gentle with me, but a little testing. Liberty took my hand in his mouth, a slight pressure, just enough to mark the skin. I lean out over the side of the boat and explain my tentativeness to them. Tell them that they must respect my fear.

Robert believes they communicate with ESP. Swimming with Florida last year she entered his head, swimming directly towards him a beam like a searchlight electrified the top of his head. He was entered by her strong female intensity. Robert has not made love with his wife in three years. He believes that sexual contact is less profound than mental contact. He does not like to touch the dolphins.

I sit on the seawall not watching the dolphins. I have decided to try to not do anything. To become delphinic. I count my breathing and fasten on a patch of water just before me. The water becomes a honeycomb, then fills with fishes. I see the silver peaks of their tails cutting the surface and wrench my mind back to my breathing. The water honeycombs again. A plane passes overhead. I look up, trying to see what holds it up— a pyramid of different air. I cannot see it, but imagine it. The intensity of the effort makes the back of my head feel as if it will explode. My senses reach only so far, but there are functions of air and speed and space that exist, that work. There may be functions of mind that work, that we do not sense or understand yet.

Robert is swimming with Florida and Liberty. I sit on the seawall defocusing, counting my breathing and letting my mind float. I understand that I cannot call the dolphins, cannot will them to me. There is a lightning storm over the city and the flat gunmetal grey plain of the horizon is wrenched open by the lightning. It is as if the sky comes apart for a fraction of a second, revealing the light that lies just beyond this curtain of air. Robert cannot understand why Florida and Liberty are not paying any attention to him. He is swimming in the center of the lagoon, the dolphins are holding in by the seagate, almost motionless in the heavy air, blowing and breathing together, pointing seaward. They ignore Robert. It seems as if each time I can become completely transparent, holding no thoughts and seeing nothing but the central core of my breathing, a dolphin appears in my field. The first time it happened I was ecstatic. Now I just sit and breathe and look at the sky cracking open, aware that the dolphins are by the gate. I know what to do— but I cannot explain it, even to myself.

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THEORETICAL ECOLOGY: BEGINNINGS OF A PREDICTIVE SCIENCE

BY GINA BARI KOLATA

Best news in a long time. I don't know a thing about Gina Kolata except that she okayed this reprint from Science, 1 Feb 1974 (Science costs $18/yr from AAAS, 1515 Massachusetts Ave, Washington DC 20005).

—SB

Ecologists have been known for their exhaustive field studies in which they describe and catalog species in a given area and search for patterns in the interactions among the species. Although some ecologists still undertake such studies, many are analyzing systems with theoretical models and are using descriptive studies to confirm and extend their models.

Ecological systems are being analyzed in two ways: with computer models of entire ecosystems and with mathematical models of particular phenomena. The computer models, simulations of specific environmental situations, incorporate the unique characteristics of environments [**Science** 175, 46 (1972)]. E.O. Wilson of Harvard University believes that, because these computer models are so specific, they do not often lead to general laws. The mathematical models have as their purpose the discovery of general laws.

In conjunction with field studies, mathematical models form the basis of present-day theoretical ecology. By isolating the key components of a system and treating them as much as possible in isolation, ecologists attempt to produce models that describe broad classes of phenomena. Various types of mathematics are used in the construction of the models. For example, some models consist of systems of differential equations that describe competition among species, and others consist of statistical measures that describe species diversity. This approach to ecology, strongly influenced by the late Robert MacArthur of Princeton University, is now providing insight into fundamental problems, including the problems of explaining species distributions, community structure, and competitive interactions among species. Although the models are highly idealized, they have led to some results of great generality. One such result is the theory of species equilibriums on islands.

The theory of species equilibriums on islands, one of the first theories to be both tested and applied, influenced scientists to study island populations in their investigations of community structure and species competition and is now being applied to problems of conservation. The realization that national parks can be treated as islands has enabled researchers to predict the rate that species in national parks will become extinct, to predict the number of species that will eventually survive, to describe the types of species most likely to survive, and to specify park designs that will minimize extinctions.

Islands support fewer species than large land masses, smaller islands support fewer species than adjacent larger islands, and remote islands support fewer species than islands nearer a source of colonists. MacArthur and Wilson proposed that these patterns of species distribution result from a dynamic equilibrium between immigrations of species to an island and extinctions of species on the island. They assumed that immigration rates increase with island area and with proximity of the island to the mainland. Extinction probabilities, which they assumed to result from random fluctuations in population sizes, decrease as the population increases in size. Thus they assumed that extinction rates decrease as island area increases. They used these assumptions as a basis for a mathematical model consisting of differential equations that describe species equilibriums on islands.

The MacArthur-Wilson model permits several predictions: For example, the number of species on recently depopulated islands will increase approximately exponentially as species return to those islands and, at equilibrium, as many species will become extinct as will arrive on an island. The highest extinction rates are predicted to occur among rare species and on small islands. Wilson points out that these high extinction rates were previously not appreciated and that they augur grave consequences for wildlife conservation in national parks.

Predictions Are Verified

Several predictions of the theory have been verified by periodic surveys of species on islands. In one such study, Jared Diamond of the University of California in Los Angeles surveyed birds on the nine Channel Islands off the coast of California and compared his

survey taken in 1968 to the records of surveys taken in the years up to 1917. Both the earlier and Diamond's surveys showed that none of the islands supported as many species as comparable areas on the mainland. On each island, the number of species in 1968 remained about the same as before 1917, but about 17 to 62 percent of the bird species present on a given island before 1917 were absent in 1968 and had been replaced by other species. Diamond, John Terborgh of Princeton University, and others have performed similar studies of species on other islands. Their results qualitatively confirm the predictions of the MacArthur-Wilson theory.

The prediction that the number of species on recently depopulated islands will increase exponentially can also be tested. The first test came from Wilson and Daniel Simberloff, who is now at Florida State University. After surveying the arthropods on six small mangrove islands off the west coast of Florida, Wilson and Simberloff fumigated the islands and monitored the subsequent return of arthropods to the islands. During repopulation the number of species grew exponentially until an equilibrium was reached. At equilibrium the number of species of a given island was the same as that before fumigation, although many of the individual species were different.

MacArthur and Wilson's theory also yields the prediction that, when an island is newly formed from the mainland, the number of species on that island should decrease approximately at an exponential rate until a new equilibrium is attained. It is this aspect of the theory that is directly applicable to wildlife preservation in national parks.

Diamond and Terborgh have independently applied MacArthur and Wilson's theory to specific islands in order to develop a model that predicts the number of species that will become extinct on a land bridge island of a given area as a function of time. Their model is based on studies of the return to species number equilibrium of land bridge islands formed about 10,000 years ago from New Guinea and from Central America when the sea level rose after the most recent Pleistocene glaciation caused inundation of former land bridges.

Diamond and Terborgh stipulate that, by definition, a species population of a land bridge island is at equilibrium when the number of species on that island equals the number of species on a nearby oceanic island that has the same area and that was never connected to the land. Since the land bridge islands are fairly far from the mainlands, the rate of migration to the islands is assumed to be negligible. Knowing both the time elapsed since the islands were formed and the expected numbers of species on the island at equilibrium, Diamond and Terborgh proposed a relaxation time or a constant of decay to species equilibrium that is a function of island area. Terborgh tested his model on Barro Colorado Island in Gatun Lake.

Barro Colorado Island, a former hilltop, was formed 60 years ago when the Panama Canal was constructed and surrounding valleys were flooded. It was set aside as a wildlife refuge and, 50 years ago, its birds were surveyed by Edmund Willis of Princeton University. Terborgh found that 13 to 18 forest species became extinct between that first survey and surveys made recently. The species that became extinct on the island are still present on the mainland. According to Terborgh's calculations, based on data from the land bridge islands, 16 to 17 species would have become extinct on Barro Colorado in the past 50 years. Terborgh is careful to point out that one field study is insufficient to confirm his results, but he is nonetheless encouraged by his ability to estimate extinction rates.

Terborgh, Diamond, and Wilson warn that, since national parks are isolated areas often surrounded by urbanization or disturbed habitats, planners of national parks should be aware of these predictions of the rate of species extinctions as a function of island area. Wilson believes that the observance of certain precautions can minimize extinctions in national parks. For example, since those species that are present in smallest number, such as large mammals, are most likely to become extinct, the extinction rate for such species should be estimated, and the parks should be planned so that their initial extinction rates will be as low as possible. (Since the curve of species extinction is one of approximately exponential decay, the initial extinction rates are the highest rates.) Terborgh believes that tropical rain forest parks would have to cover at least 1000 square miles if extinction rates are to be acceptably low. He defines an acceptable extinction rate as one in which less than 1 percent of the initial species becomes extinct per century. Even with parks this large, he doubts that the largest predators, such as the jaguar and the harpy eagle, can be saved.

Since park areas are, of necessity, restricted, Willis, Wilson, Diamond, and Terborgh point out ways to design parks so that extinctions would be minimized. For example, if parks must be divided, the fragments should be connected by corridors of natural habitat. Wilson also proposes that extinctions could be minimized if it were known how resources are allocated among species in communities (species packing). If species packing were well understood, certain species that are close to extinction in one habitat may be fitted successfully into other communities.

Community Structure Is Investigated

Species packing has been studied by MacArthur and Robert May of Princeton University and by Diamond. MacArthur and May approached the problem theoretically by investigating the differences among competing species, whereas Diamond approached the problem empirically by investigating

rules that govern community structure.

The principle of competitive exclusion is fundamental. According to this principle, two species cannot coexist if they do exactly the same things (such as obtain the same food in the same places in the same way). MacArthur and May investigated the question of how competitive exclusion determines community structure by studying the stabilities of communities whose members have overlapping niches. A niche is operationally defined by the way in which the species utilize resources. For example, Diamond has documented bird species with nonoverlapping niches that are defined by altitude on a mountain. All of the species in one group take berries for food but one species lives only in an altitude range of sea level to 3,200 feet, a second from 3,200 to 4,500 feet, and a third from 4,550 to 11,000 feet. Other species have niches that overlap.

MacArthur and May investigated the magnitude of niche separation, which they found to be determined by the requirement that a community maintain a stable equilibrium in spite of environmental fluctuations. They define a population that is at equilibrium to be at a stable equilibrium if that population can be perturbed and yet will return, after a period of time, to its former equilibrium. For example, the arthropods on the mangrove islands were at a stable equilibrium since the number of arthropods species on the islands at equilibrium was the same after the fumigation as before.

MacArthur and May showed that, if the environment never changes, a community can be at a stable equilibrium, and there is no limit to the amount that their niches can overlap. If random variations in the environment are taken into account, there must be a minimum distance between niches of a community at stable equilibrium. For example, assume that the sizes of the food eaten by each species are normally distributed. (The graph of the probability that a species eats food of a given size is bell shaped and symmetrical.) Then if species are ordered according to the sizes of their foods (a resource spectrum), the assumption of stable equilibrium leads to the prediction that the average food sizes of two species that are adjacent on the resource spectrum differ by approximately 1 standard deviation in the food size taken by either individual species. MacArthur and May cite several field studies that support this model, such as work on bird niches by Diamond and by Terborgh.

Another approach to the species packing problem is taken by Diamond, who is developing assembly rules for species. The assembly rules are based on the fact that species fit into communities in different ways. Some species fit well into communities with many species but fit poorly into communities with few species. Conversely, some species, such as the "super-tramp" bird species that are always among the first to colonize a defaunated island, fit well only in communities with few species. Other species can only fit in communities when combined in certain ways. A combination of three species may fit together in a community (a permissible combination), but any two of them alone may be unable to fit in (a forbidden combination).

From investigations of the structure of bird communities, Diamond has constructed incidence functions that describe the probability that a given species will occur in a community in terms of the other species already present in that community. He has derived certain rules that govern community assembly. One such rule states that permissible combinations of species will resist invaders that would transform them into forbidden combinations. Diamond believes that, in addition to their application to wildlife conservation, assembly rules may be applied to a major unsolved problem in theoretical ecology– the problem of coping with complexity.

Theoretical ecology has dealt mainly with one-dimensional systems. Competition studies model one species competing against another although, as evidenced by Diamond's work on community structures, this model is not always appropriate. Many species act together to compete against other groups of species. Niches may also depend upon several variables rather than upon a single variable (such as food size) analyzed by MacArthur and May. The development and analysis of multidimensional models presents a challenging problem for theoretical ecologists.

Theories of community structure and island biogeography are now being extended to other fields of research such as anthropology and epidemiology. John Terrell of the Field Museum of Natural History in Chicago is applying results from theoretical ecology to studies of the evolution of human populations. Joel Cohen of Harvard University has developed a probabilistic model of malaria epidemics based on the concept that species already on an island (in this case, the host for the malaria protozoa) affect the subsequent establishment of other species on that island. Such applications of theoretical ecology promise to enrich both other fields of research and theoretical ecology. For example, Montgomery Slatkin of the University of Chicago and his colleagues have extended Cohen's model to describe colonization by species with high extinction rates (such as insects) in situations where the colonists come from other habitats within the system.

The unsolved problems in theoretical ecology are many, but Diamond, for one, is optimistic about the future. He compares the state of theoretical ecology today to molecular biology 15 years ago– new concepts and techniques for research have recently been developed, and, he believes, the next two decades will see the completion of a revolution in the study of ecosystems.

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Land Use

Oboy, Free Land in Alaska!

Dear Mr. Stewart and Ms. Cokeley:

The Alaska State Division of Lands suggested I write you concerning homesteading on federal lands in Alaska, with information for publication in the "Whole Earth Epilog." Its predecessor, the "Whole Earth Catalog," printed information only on state programs although there are both state and federal land programs in Alaska.

Several years ago, when most federal lands in Alaska were still open to homesteading, roughly two-thirds of the homestead applicants could not fulfill legal homestead requirements. Today, homesteading is legal on approximately 11 million acres, about three per cent of Alaska's land area. I emphasize the word "legal" instead of "possible" or "practical" because homesteading on these lands is not practical and may not even be possible. Homesteading is a law which allows farmers to obtain unreserved federal land at low cost, and persons who want land for any other purpose but farming cannot homestead.

Let me generalize about the lands open to homesteading today. They are remote, meaning that the closest lands are some 100 air miles from a large town such as Fairbanks or Nome. They are inaccessible, meaning that there are no existing roads to these lands, or closer than 100 to 300 miles to the open lands. There is no transportation to these lands; to reach them you must fly to the nearest airstrip or lake and walk in on foot.

Most of the lands are in continuous permafrost zones, meaning that the ground is permanently frozen, although the uppermost inches may thaw in summer. Summer temperatures average 40 to 60 degrees and peak at 70 or 75; winter temperatures average 10 to -10, and dive to -70 or below. Because permafrost prevents normal drainage, the soils are often brackish and infertile. There are approximately 16 inches of precipitation yearly, similar to semi-arid parts of the Lower 48, with part of this precipitation as a 32- to 64-inch annual snowfall. The growing season is somewhere between 60 and 90 days.

Incidentally, there are other problems potential homesteaders will have to face. These are personal and social, but nonetheless real. A homesteader in the areas now open for homesteading will have to live without running water, electricity, telephones, schools, churches, hospitals, post offices, community facilities, and probably neighbors. Marketing of farm products at competitive prices will be difficult due to distance from markets, non-existent transportation, and Alaska's small population.

We have prepared a brochure on homesteading which answers many questions a potential homesteader should ask before coming North to homestead. My purpose in writing you is to ask for help in giving accurate information to your readers. Homesteading is a thing of the past. Today, there is no such thing as free land, even in Alaska.

Sincerely yours,

Arthur R. Kennedy
Chief, Public Affairs
United States Department of the Interior
Bureau of Land Managment
State Office
555 Cordova Street
Anchorage, Alaska 99501

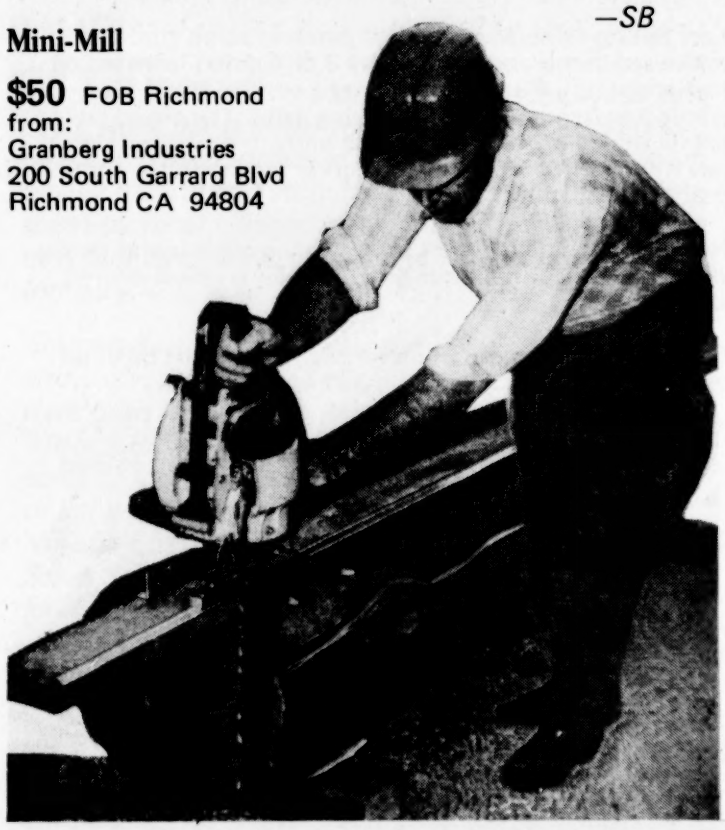
One-man sawmill update

The manufacturers of the Alaskan Mill— an attachment to your chainsaw to convert logs into boards— announce a new system which costs only $50 (The old one was $71.50).

—SB

Mini-Mill

$50 FOB Richmond
from:
Granberg Industries
200 South Garrard Blvd
Richmond CA 94804

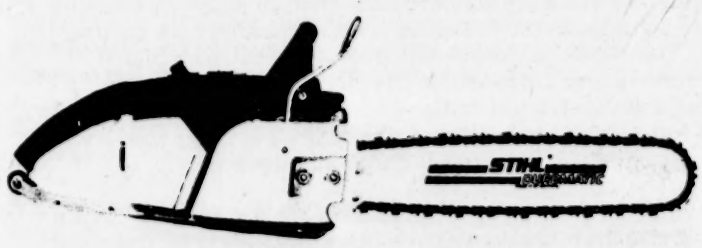


Deal on Chainsaws?

Paul Harsch at Mountainside Power Equipment is offering Whole Earth readers a possible bargain on new Stihl Chainsaws— list price, but free freight and a free chain ($25 worth). Anyone care to check him out? Who knows about Stihl saws? Mountainside also claims they can fill Roto-tiller orders right away rather than with 2— 3 month delay.

—SB

Mountainside Power Equipment
Box 11
Pownal, VT 05261



STIHL 013 AV-14, $215

Another use for urine besides washing wounds

I have some notes here for persons desiring to sensibly utilize one of our most abundant "waste" products, namely, piss.

Urine.

I have found that certain plants love piss. (Mine, anyway) It is a solution high in nitrogen-containing and organic chemicals. Some plants probably can't tolerate undiluted urine, and I diluted mine about 2 bladderfuls to a gallon of water. Different concentrations for different plants. Experimentation.

Last Spring I discovered a small patch of some kind of milkweed in the yard and: Every 3 or 4 days I urinated on half the plants. The other half was a control group. The whole patch received light watering daily. The pissed-on plants were 3 times as high as the untreated ones within a few months. Their color was a darker green and they appeared healthier than the controls.

NOTE: Maybe meat-eaters urine, having more toxins than vegetarians, wouldn't be so good for plants unless diluted a great deal.?

Besides this horticultural use for piss, there must be other tried and true applications. I have heard of these:

1. mordant for fixing natural dyes in material.
2. tanning agent for preserving hides and skins.
3. marking the boundaries of your "territory" to keep predators from livestock & gardens.

Well, it's an idea.

Love,

Hank
Nelson, B.C.

Horse ills and shoes

Jeb Barton writes as good a suggestion letter as we've seen this issue.

—SB

Epilogians

Glancing through the **Last WEC** I noticed again your book on horseshoeing and Vet notes, page 67.

Thinking about the coming **Epilogue** I may have some helpful information in these areas. I am a certified Farrier and practice corrective and pathological horseshoeing.

I own and have used the book you list in the **Last WEC, Veterinary Notes for Horse Owners**. My personal reference in this area is a book that I have found to be considerably more useful than the **Vet Notes.**

Lameness in Horses is my personal education source when dealing with my own horses, buying horses, or shoeing. It is direct, clearly written, very well illustrated with drawings and photographs, and written in language that is easy to follow— both common and Latin names usually occurring side by side. Every lameness is accompanied by a section on; Definition, Etiology (theory of the causes), Signs, Diagnosis and Differential Diagnosis, Treatment, and Prognosis (expected future course of the disease). Virtually all horse lamenesses of any significance are included and every common lameness is throughly covered.

If you know nothing of horses and are thinking of buying one, the first 50 pages of the book (including 32 drawings and photos) offer an excellent introduction to conformation guidelines— what a horse should and should not look like to the untrained eye. Very informative.

There are also 10 additional pages explaining how to determine whether or not the horse you are looking at is "sound"— "Examination for Soundness."

The book includes a section on horseshoeing and trimming, 25 pages. The information is good and well illustrated. I regard it as helpful to the unfamiliar but not to be used as a sole guide to someone who has never trimmed a horse's foot, let alone shod one. There is a limit to the do-it-yourself-from-a-book and I feel it stops abruptly with living things. No one should attempt to trim (certainly not shoe) a horse until they have had some first hand instruction from a reliable teacher. 90% of horse lameness occurs from the knee down!

Lameness in Horses. 563 pages. Cloth bound. By O.R. Adams, DVM, MS published by, Lea and Febiger, Philadelphia—1972. Second edition. (Probably available at any Agriculture School book store.)

I have also studied in depth the book **Horseshoeing** by Lungwitz that is also listed on page 67 of the **Last WEC.** The book is good. Illustrations are excellent but the text is incomplete and some of the information is antiquated.

I suggest **Elements of Farrier Science.** It is modern, to the point, and somewhat more complete and comprehensive than the Lungwitz book. It is a more useful all around book. As it says, "...Farrier Science." (Caution: this book advertises "Enderes" tools in the back. Enderes tools are very poor quality and are not worth the buy.)

Elements of Farrier Science. 169 pages. By D.M. Canfield. Printed and distributed by Enderes Tool Co. Inc. Albert Lea, Minnesota 56007. This book can probably be ordered through any feed or agriculture supply store.

If you could use a complete list of horseshoeing and trimming tools with a breakdown as to tool quality I would be glad to give you my recommendations. (The average horse needs trimming nine times a year— a reason for good tools, not just fair ones.)

Best Wishes With the Epilog—

Jeb Barton
Nomadics
Tipi Makers
Star Route, Box 41
Cloverdale, Oregon 97112

Uses for Superweed

The following is an enlightening exchange from **Organic Gardening and Farming** *(Dec 1973).*

Q. My lot has become overrun with kudzu vine. The folks next door used pesticides and they have no more vines and no insects either. But I don't want this. Is there any way of getting rid of this vine?

A. Once it gets going, kudzu vine is difficult to check. Plowing it under when new growth starts in spring is one method of destroying it. Kudzu is a deep-rooted perennial of the legume family, whose roots often go down eight feet and more. Once planted and if properly cared for, kudzu can last a lifetime. In fact, in many areas it's considered drought insurance by farmers, rather than a rank nuisance. Its uses in agriculture include erosion control, permanent pasture, soil-improver when practiced in rotation, hay material equal in value to alfalfa mulch and high-protein livestock feed. Testing as high as 18 percent protein, kudzu is well-liked by cattle, horses, sheep, hogs, goats, rabbits and poultry.

REFORM MINUS GOVERNMENT

Vinoba Bhave began walking across India in 1952 when he was invited to address a conference of Gandhians 350 miles from the ashram where he had been in meditation since Gandhi's death. He has trekked more than 44,000 miles seeking Bhoodan, voluntary gifts of land, for redistribution to India's landless lower castes.

Vinoba met Gandhi in 1916. In 1940 he was chosen by the Mahatma to lead the first civil disobedience movement against the British. Upon Gandhi's death, Vinoba became his spiritual heir and a saint to Gandhi's followers. The saint is a traditional Indian figure who exemplifies ethical purity, personal renunciation, nonviolence and service to others. Vinoba took a vow of celibacy at the age of 10; poverty at the age of 17; service to others at the age of 24.

He walked to re-establish contact with India's rural population (80% of total) and to inspire Bhoodan and Gramdan, "village-gift". The first Gramdan occurred in 1956 when all the land-owning villages of one community gave their properties to Vinoba. He returned their gift– as one parcel of land to be owned by the community as a whole. Vinoba carefully avoided creating any external structure guidelines for the Bhoodan and Gramdan. But as he walked, he gathered disciples (mostly young people from urban high schools and colleges) who stayed behind to carry out his pledges. An organization of his disciples, Sarva Seva Sangh, includes 5000 full-time independent workers throughout India.

Some of the Sarva Seva Sangh still walk across rural India. Most work in self-sufficient ashrams on Bhoodan land which also serve as local schools and meeting places. The Gramdan workers bring practical application to Vinoba's saintly vision: implementing the land-pledges, digging wells, arbitrating community disputes.

The Gramdan process begins when each land owner turns the legal title to his property over to the village. 20% of this land is leased, rent free and in perpetuity, to the landless members of the village. 80% is leased back to the original owner on the same terms. There is a firm stipulation against sale of land so that it does not fall into the hands of uncooperative land owners. Each villager agrees to give one-thirtieth of his yearly income (the equivalent of one day's work per month) to the central fund. This is payable in cash, produce or labor. The fund is used to pay federal and state land taxes. It has also been spent by local villages on tractors, irrigation wells, a new bull, and the establishing of a local handicraft industry.

Educated Indians consider the Gramdan outmoded, and believe that it will die with Vinoba. His concepts have been ignored by government planners. But Vinoba Bhave has helped to redistribute 3.5 million acres of land in a country where land is the measure of value. 150,000 villages have pledged themselves. Vinoba Bhave, 79, is in meditation in his ashram. The Sarva Seva Sangh continue his challenge to India's land owners, "I have come to loot you with love."

-PC

The following interview was printed in Resurgence in 1969 and reprinted in the Peacemaker, 1970. We saw it in Manas (Feb 20, 74– Manas costs $5/yr from Box 32112, El Sereno Station, Los Angeles CA 90032) and reprint it, fourth generation, herewith.

–SB

SATISH KUMAR: For the last fifteen years you have been on the march. What are you aiming at?

VINOBA BHAVE: At revolution. In other words, I am aiming at the liberation of people from all kinds of suppression and exploitation. We need to be liberated from the institutions which exercise authority in the name of service. Institutionalized religion, for example, is an oppressive obstacle to the free experience of spirituality. Similarly, institutionalized politics in the form of state, parliament, and parties have killed the sense of participation.

SK: You want to liberate people from the government, but some good governments do a lot of good work.

VB: Good work which is done by government services is very far from good in its effects upon the minds of the people. When elections take place the ruling party will ask for your votes because of all the good work they have done. If it is true that they have done good work, the people will be oppressed by the sheer weight of their charity and that is exactly what saddens me.

SK: Why don't you protest strongly when the government does something wrong?

VB: It is true that I do not make such protest, but I do raise my voice when the government does something good. There is no need for me to protest against the government's faults, it is against its good deeds that my protests are needed.

I have to tell the people what sheep they are. Is it a matter of rejoicing if you all turn into sheep and tell me how well the shepherds look after you? What am I to say? It seems to me that it would be better if the shepherds neglected their duty. The sheep would then, at least, realize that they are sheep. They might then come to their senses and remember that they are, after all, not sheep but men, men capable of managing their own affairs. This is why my voice is raised in opposition to good government. Bad government has been condemned long ago by many people. We know very well that bad governments should not be allowed but what seems to me to be wrong is that we should allow ourselves to be governed at all, even by a good government. To me the politics of government is not people's politics. We must find the courage to believe that we are capable of managing our own affairs and that no outside authority can stop us.

SK: It seems that you want no government at all, Vinoba.

VB: I want self-government.

SK: What is the characteristic of self-government?

VB: The first characteristic is not to allow any outside power in the world to exercise control over one's self and the second characteristic is not to exercise power over any other. These two things together make self-government and people's politics. No submission and no exploitation. This can be brought into being only by a revolution in the people's conscience and mind. My program of giving and sharing is designed to bring it about. I am continually urging that believers in nonviolence should use their strength to establish a government by the people and put an end to government by politicians. There is a false notion in the world that governments are our saviors and that without them we should be lost. People imagine that they cannot do without a government. I can understand that people cannot do without agriculture or industry, that they cannot get on without love and culture, music and literature, but governments do not come into this category. I would suggest that all our administrators and politicians should be given leave for two years, just to see what happens in their absence. Would any of the ordinary work of the world come to an end? Would the dairyman no longer make butter or the market gardener not sell vegetables? Would people stop getting married and having babies? If the government were to take leave for two years it would destroy the popular illusion that a government is indispensable.

SK: But some kind of government will always exist. Can you give some constructive suggestion to make governments better?

VB: It is difficult to make governments better, but if there is any ideal form of government then I would say that the best kind of government is the one where it is possible to doubt whether any government exists at all.

We ourselves should be seeing to the affairs of our own village, or community, or town, or locality, instead of doing just the opposite and handing over all power to the center. The less activity, the better the government. An ideal government would have no armies, no police force, and no penalties. The people would manage their own affairs, listening rationally to advice and allowing themselves to be guided by moral considerations.

SK: The need for government varies when we have conflicting situations and a clash of interests between the classes.

VB: It is impossible for the real interests of any one person to clash with those of others. There is no opposition between the real interests of any one community, class, or country and those of any other community, class or country. The very idea of conflicting interests is a mistaken one. One man's interests are another's, and there can be no clash. If I am intelligent and in good health, this is in your interest. If I get water when I am thirsty it benefits not only me but you also. If we imagine that our interests conflict, it is because we have a false notion of what constitutes our interests.

SK: You command a significant influence on the government. Why do you not insist that the government passes a law to socialize the land? Why do you have to wander so from village to village?

VB: The spreading of revolutionary ideas is no part of the government's duty. In fact, revolutions cannot be organized and brought about by the established institutions of politics. The government can only act on an idea when it has been generally accepted, and then it is compelled to act on it. We say that in India we have democracy, then the government is the servant and the people are the masters. When you want to get an idea accepted, do you explain it to the servant or to the master? If you put it before the master and he approves, he will instruct his clerk to prepare the deed of gift. That is why I am putting my ideas before you— it is you, the people, who are the masters.

SK: If the revolutionaries are in power they can bring revolution in the society.

VB: As I explained, the authority of the government is incapable of bringing about any revolutionary change among the people. The day revolution gets the backing of the government it declines, becomes bureaucratic, institutionalized, and conformist. A very good example is the Russian revolution. You can see how revolutionaries become power mongers and office-seekers. Similarly, the decline of the Buddhist faith in India dates from the day when it received the backing of the governmental power. When the Christian faith was backed by the imperial power of Constantine, it became Christian in name only. The power of religion practiced by the first disciples of Christ was seen no more and hypocrisy entered the life of the church. In our own country history shows that when the movements of revolution and religious reforms won royal favor they were joined by thousands who were not really revolutionaries at all but merely loyal devotees of the ruling king. Therefore, do not allow yourself to imagine that revolutionary thinking can be propagated by governmental power. On the contrary, if there should be any genuine encounter between them, revolution would destroy the power of the state. The two can no more exist together than darkness and the sun. The exercise of power over others is not in accordance with revolutionary principles. It is clear from a study of history that real social progress has been due to the influence of independent revolutionaries. No king exercised the influence which Buddha exerted and still exerts on the life of India. The Lord Buddha renounced his kingdom, turned his back on it, and after his enlightenment the first person he initiated was the king, his own father. Later came the emperor Ashoka and a political revolution took place in India.

SK: Until we achieve this utopia what should we do?

VB: We should do everything at our command so that the need for a government should progressively diminish. In the final analysis the government would give up all executive power and act in a purely advisory capacity. As the morals of the people improve, the area of the authoritarian government will be reduced and government orders will be fewer and fewer. In the end it will issue no orders at all. The ultimate goal of my movement is freedom from government. I use the words "freedom from government" and not absence of government. Absence of government can be seen in a number of societies where no order is maintained and where anti-social elements do as they please. A society free from government does not mean a society without order. It means orderly society but one in which administrative authority rests at the grass roots level and every member of the community has active participation and involvement. For this reason the purpose of my march is to rouse the people to an awareness of their own strength, to get them to stand on their own feet. I want to see all the village lands in the hands of the village and not under private ownership. And to that end I am trying to get the common people to realize their power and organize it independently.

SK: How will you go about bringing this people's power?

VB: The establishment of such a participatory, non-bureaucratic, self-directing society calls for a network of self-sufficient units. Production, distribution, defense, education, everything should be localized. The center should have the least possible authority. We shall thus achieve decentralization through regional self-sufficiency. I do not expect that every village should immediately produce all its own needs. The unit for self-sufficiency may be a group of communities. In short, all our planning will be directed towards a progressive abolition of government control by means of regional self-reliance. Our goal should be that every individual becomes as self-reliant as possible.

SK: Is that what you call freedom?

VB: Yes. Because no real freedom exists today and we shall not get it so long as we carry on with our representative democracy. We shall not get it until we decide to make our own plans with the use of our own brains and carry them out in our own strength. As long as a few individuals are given all the power and the rest of the people hope that the government will protect them, this is not real freedom. The present kind of democracy is a guided democracy, whereas in a free society we will have a direct democracy. We shall not hand over all the public services to the few representatives. In America all the power is in the hands of the President. If he should make an error of judgment he might set the whole world on fire. It is a terrible thing that such power should be entrusted to any representative. That is why throughout the world today there is no real freedom but only an illusion of freedom. To obtain this real freedom, we must form village councils, community councils, peasants' councils, workers' councils, on a small scale, and these councils should run their own defense, and manage their own markets. This way there will be a general renewal of self-confidence and common people everywhere will get experience of public affairs.

SK: The proposal you are making will turn the whole system upside down and social life will be upset. Does this fit in with your philosophy of nonviolence?

VB: To many people nonviolence has come to mean that society should be disturbed as little as possible. Our present set-up should continue to function without hindrance. Some people understand by nonviolence merely that the changes necessary will be carried out extremely gradually. Let there be no painful sudden change and so nonviolence is rendered innocuous. But this way revolutions are never carried out. Things remain pretty much as they are and people get satisfaction by adopting an ideal, paying it lip service, and talking about it. This concept of nonviolence is very dangerous for revolution and very convenient to the cause of lethargic society. So I beg you not to adopt any "go slow" methods of nonviolence. In nonviolence you must go full steam ahead, if you want the good to come speedily you must go about it with vigor. A merely soft, spineless ineffective kind of nonviolence will actually encourage the growth of the status quo and all the forces of a violent system which we deplore. A non-revolutionary nonviolence is a conservative force and, therefore, it is not nonviolence. Nonviolence is an active and effective weapon to fight against injustice and at the same time to build an alternative society.

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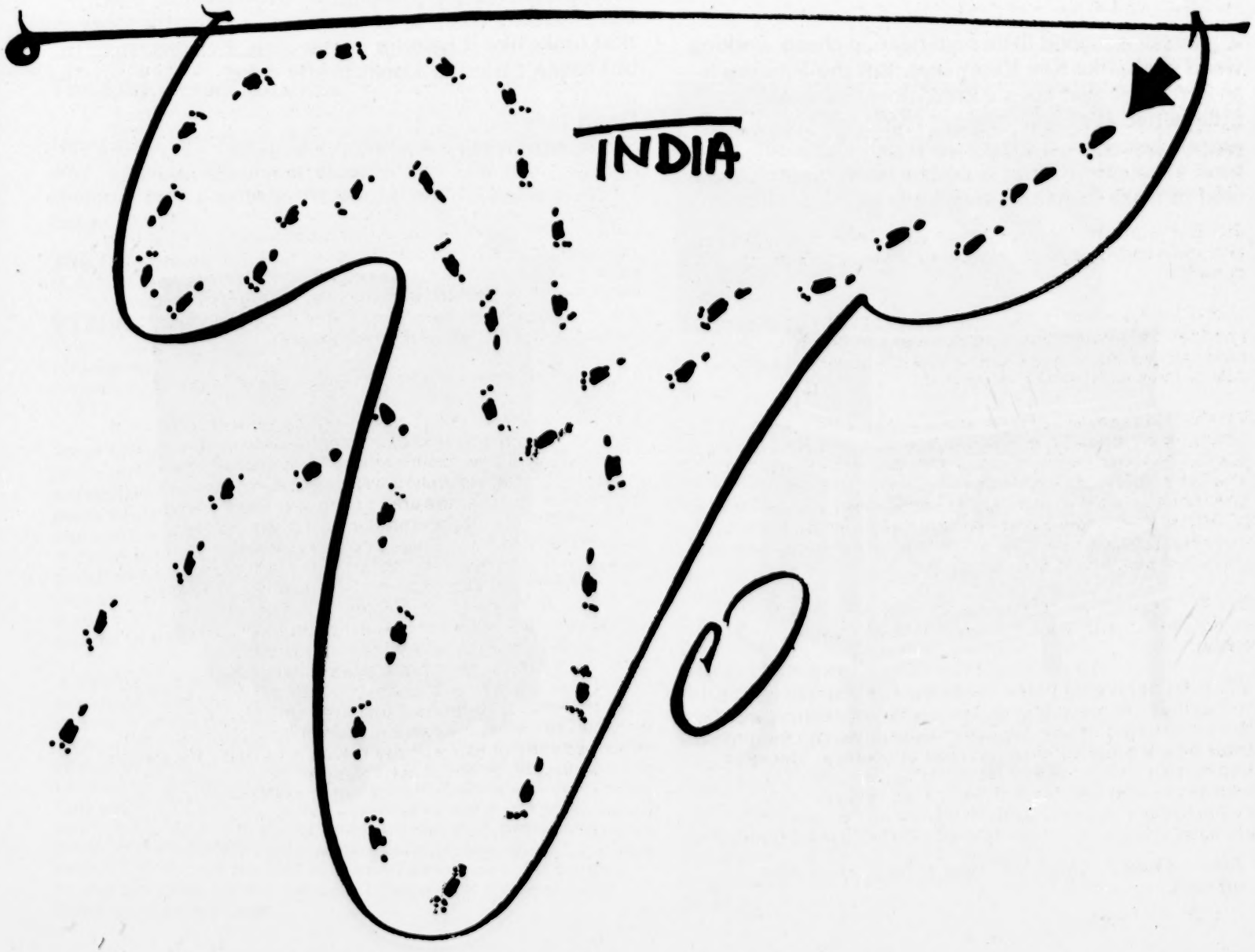


Good Stoves

Whole Earth Epilog:

On wood heat— two suggestions and a request:

1. By far the best cast iron wood stove I've seen is the Jøtul out of Oslo, Norway. There are several models, including a Franklin type, priced from $185 to $450. The two I have are box stoves— both beautifully made of very heavy castings coated with dark green enamel. Air tight firebox with internal baffle to recirculate warm air. Only cast iron stoves I know that will hold a fire as long as our automatics, Ashley and Riteway. But Jøtul is better-built than anything, and very handsome— the Aladdin lamp of the stove world. Fuel economy excellent, at least as good as Ashley. (Aksjeselkapet, Jøtul, Postbox 6206, ET. Oslo 6, Norway, Stein Hagen, division manager. U.S. Importer: Eva Horton. Kristia Associates, Box 1461, Portland, Maine 04101. 2 U.S. Dealers: David Lyle, So. Acworth, NH 03607; L.L. Bean, Freeport, Maine 04032.)

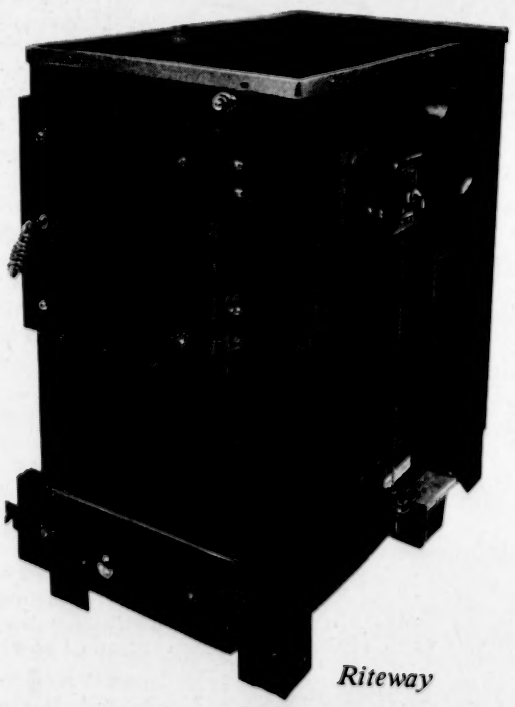
2 . Ashley is a good little hard-heating cheap working wood stove, like Ken Kesey says. But the Riteway is an automatic that costs a little more and works a little better. It's made of sheet metal but heavy gauge— better for the hard use it gets in the sub-zero here. (Though cast iron would be better yet.) Riteway used to make furnaces, and people in these hills still heat houses with them. They're homely, like the Ashley— also economical on fuel. But Riteway's automatic thermostat works better. (Marco Industries, Inc., Box 6, Harrisonburg, Virginia 22801.)

3. I've been gathering information on alternate heat sources for a few years. Would like to exchange lore with anyone interested, with the thought eventually of seeing it published. There are some good heating ideas kicking around obscure corners of the world. Want to hear from anyone with knowledge of same— especially masonry stoves or ovens, Swiss soapstone stoves, ceramic stove, sub-floor flue systems and the like.

Footnote: In last Catalog, the review of Portland Stove Foundry products said, "they appear to be" etc. We've used three of them (currently cook on a fine Queen Atlantic) and they are good. They're old-style cast iron stoves— good heaters, handsome, well-made, reasonably durable, but not particularly economical on fuel. Washington Stove Works, Box 687, Everett, Wash. produces a cast iron parlor stove that looks like it belongs in this class. I've seen it, but haven't tried it. Looks pretty good.

David Lyle
So. Acworth, N.H.
03607

Jøtul— About 30" high, 30" long; takes 5" stove pipe off back.



Riteway

Heat Saver

Dear Whole Earth people—

I hear that you are going to bring out another edition or version of the Whole Earth Catalog. If so, I have a good suggestion:

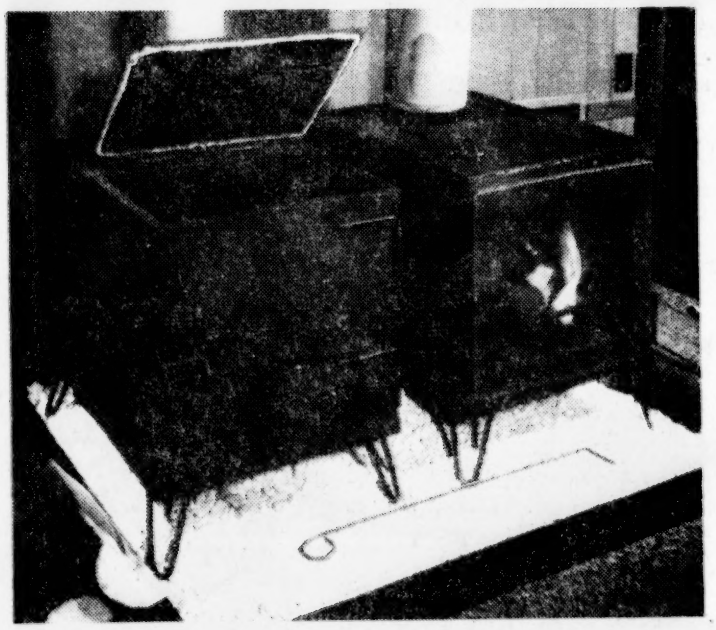
The "Heat-Saver" circulates hot air which is lost up the stovepipe of many stoves. A friend has one in the stovepipe above his wood-burner, and the resultant fuel economy and added comfort are considerable. The "Heat-Saver" can be used on oil, wood, or gas stoves, including wood-burning ranges and Franklins with a 6", 7", or 8" stovepipe. Installation appears to be easy.

They are sold by The Hubbard Creek Trading Company; Box 9; Umpqua, Oregon 97486. The cost is $78, postpaid (Feb. 74). The claim that they pay for themselves within one year seems realistic.

Anything which helps us to use energy that we have been throwing away is in the right direction.

Sincerely,

Gary Sepehar
Corvallis, Oregon



Fire Box

Here's a stove that converts to fireplace. Looks well-made. 97 lbs, 26x26x20 inches. $147.50 FOB Richmond, from:

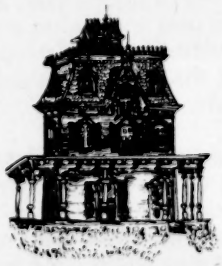
The Fire Box Company
Box 1
Richmond, Massachusetts
02154

The Old House Journal

Items such as "Teaching a Fireplace Not to Smoke" and "Antique Wallpaper Preservation" fill this splendid new monthly. Restoring old houses is a Good.

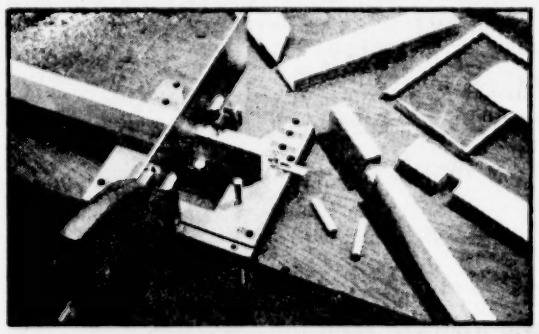
The Old House Journal
R.A. Clem Labine, ed.

$12/yr, monthly
from:
199 Berkeley Place
Brooklyn, NY
11217



After filling cracks, next most common plaster repair is patching holes made by electricians and plumbers. One particularly vexing type of repair is the "bottomless hole"—made when a workman pokes a hole through both plaster and lath, and there's nothing at the bottom of the hole for the plaster to adhere to. One way to cope with this situation is to rip out enough additional plaster so that the two adjacent studs or beams are exposed. New lath or sheetrock can then be nailed to the studs and plaster applied in the conventional manner. (More on this later.)

A simpler and less messy solution is to stuff wadded newspaper into the hole until it catches firmly on the sides and back of the interior partition space. Then after wetting edges of the old plaster thoroughly, apply thin coating of plaster of paris to the newspaper and the edge of the hole. Let plaster set for 20 min., then rewet and apply another thin coating of plaster. After repeating a couple of times, you'll build up a firm plaster base and can then proceed to patch in the conventional manner. Build plaster up to within 1/8 inch of the wall surface. (Leave base coats rough to give adhesion for the top coat.) Use trowel to get smooth finish on the final layer.



Precision Sawing Jig

Jointmaster is a precision sawing jig that cuts a wide variety of wood joints, including dovetails, mortise and tennon, mitres and half-mitres. By using nylon pins and depth stop, device controls not only angle of cut, but depth as well. Joint cutting can be repeated with production-line accuracy. Unlike ordinary mitre box, you always work saw from same direction. Available at most hardware dealers. Or order from manufacturer. $29.95 plus $1.00 for shipping from Spear & Jackson, 4767 Clark Howell Highway, College Park, Georgia 30349.

Stained Glass Primer

Just as the title suggests, Mollica presents the basic principles of working with stained glass. The steps are clearly described, and the tools and materials are introduced with the beginner in mind. There's a good glossary, a sample cartoon for a first project, and a bibliography for digging deeper.

— Reviewed by Scott Beach

Stained Glass Primer
Peter Mollica
1971;1972;1973; 87pp

$3.25 postpaid
from:
Mollica Stained Glass Press
1940A Bonita
Berkeley, Ca. 94704

or Whole Earth Truck Store

Your first leaded glass panel should be designed to develop glass cutting, leading, and soldering skills rather than to produce a work of art.

An initial panel size of about 10" x 12" is suggested. This allows you to work with ten or twenty reasonable size pieces of glass. Very small and oddly shaped pieces of glass are difficult both to cut and lead. They should be avoided.

The remainder of this chapter and the next chapter are keyed to cutting and leading this panel (Fig. 1).

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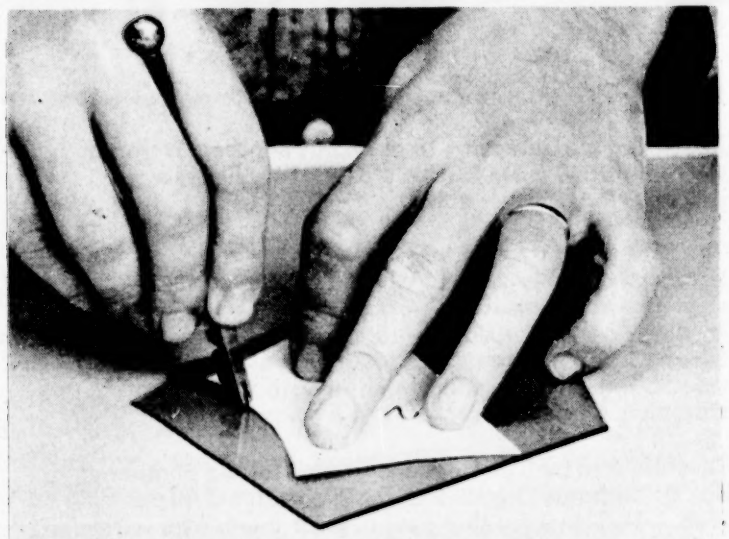

Cutting difficult edge first.

Before this you may want to practice cutting lead. Don't forget to stretch it first. To cut the lead hold it firmly on the work bench with the fingers of the left hand, place the glazing knife close to the fingers, and cut through the lead slowly. Rock the knife slightly from left to right as you cut unless the knife has a curved blade, in which case rock the blade back and forth. The rocking motion should be VERY SLIGHT, as should be your pressing on the lead. Light pressure with the slight rocking motion will allow the blade to slowly work its way through without crushing the heart of the lead.

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Tipi Fine Points

Mr. Jim H. Harding
Friends of Earth Foundation

Dear Jim:

It was nice to hear from you again. We have been away until just before Christmas, so our correspondence has been delayed. We hope you have been having a happy holiday season.

I still place orders with the company in the East and I still think they make the best commercial tipis. There are many companies now proclaiming to make "authentic" Indian tipis but most of them are still making the same old mistakes. One outfit claims to have improved the tipi by combining features of the Crow and Sioux smoke flaps. This is ridiculous, for one sets up on a three pole base and the other on a four pole, which means the tipis have to be cut to correspond. It seems to us rather presumptious for non-Indians, with little or no experience, to "improve" on a dwelling that was used by a very practical people over a period of several centuries. The main reason we wrote **The Indian Tipi** was to correct some of the faulty conceptions but it seems some people never learn.

The company I deal with is one of the biggest manufacturers of tents and canvas goods in the country and are well equipped to produce anything in quantity. They also make a commercial tipi using grommets and leather reinforcements, which I abhor, but for my personal orders follow the real Indian pattern. Everyone for whom I have ordered tipis has been very well pleased. They use grade A army duck, waterproofed with NOBLAZE, which is also flame proof and rot resistant. Making tipis to my specifications means that the customer has to tie on the peg loops himself, as we explain in the book, but this is not much of a task, actually is rather fun, and they furnish the necessary cord. They also furnish a door cover, anchor rope, lacing pins and stakes. The pins and stakes are not very Indian-looking but are serviceable. Most people prefer to make these for themselves but the ones furnished will do until such a replacement is made.

They will make either Sioux or Cheyenne style. An 18 foot tipi (size of the pattern in the book) of 10.10 ounce white grade A army duck, NOBLAZE treated, sells for $183.39 and a lining for this size is $73.13. It is of lighter material but also NOBLAZE treated. I have placed a number of orders recently to take advantage of present prices, for they tell me they may have to raise them soon to keep up with this miserable inflation. They also make tipis of 12, 16 and 20 foot size at corresponding prices. Some companies are making tipis for less, but they are not even worth the price they ask. Another company, whose tipi I have seen, and which is comparable in quality, sells for over $200, without lining. So I personally feel the tipis I have made are worth their price, which is F.O.B. from the factory, and may cost an additional $25 in freight (about $20.00 to our home here in Jackson's Hole.)

If you are interested in any of these tipis I would be happy to place any orders for you. It usually takes about two weeks to fill an order, plus shipping time.

With best wishes,

Sincerely,

Reginald Laubin
Box 4
Moose, Wyoming

Soft Technology

The term "soft technology" was coined amid the British counter-culture in 1970. Technology which is soft is gentle on its surroundings, responds to it, incorporates it, feeds it. A nuclear power-generating station doesn't qualify. A wooden windmill with cloth sails grinding local grain does.

-SB

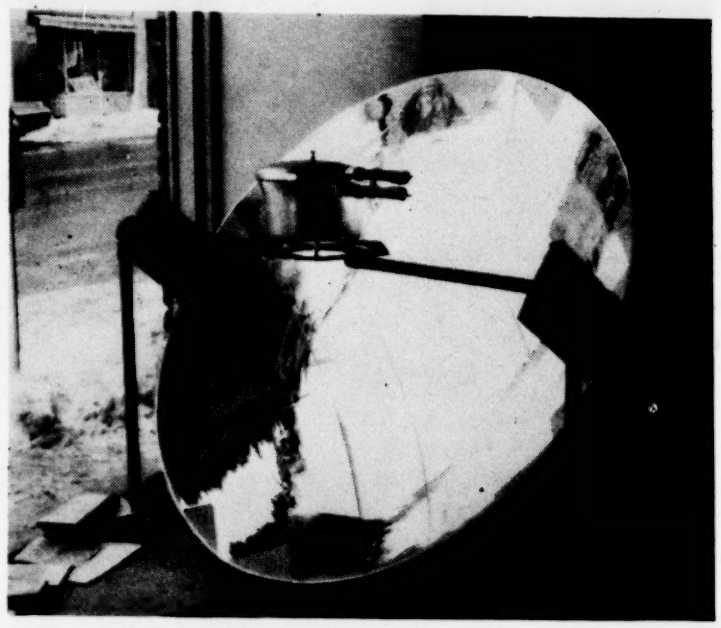
ENERGY PRIMER

Portola Institute/Whole Earth Truck Store in cohoots with New Alchemy Institute/West, Ecology Action/Palo Alto, and Alternative Sources of Energy Newsletter is in the process of pulling, putting and writing together a comprehensive primer dealing with "those other" sources of energy. So far the section headings include Solar, Wind, Water, Organic Fuels (wood, methane, alcohol) as well as probable tidbits on Geothermal, Fuel Cells, Agriculture and Architecture. The format will include explanations of the basic principles; discussion of the state of the art, in-depth looks at simple working models and different possible methods of measurement, construction and storage. The second part of each section will include Whole Earth Catalog type reviews of books, magazines, articles and hardware sources.

The Energy Primer is due for publication in the summer of 1974 and will probably cost $4.00. It will be available from The Whole Earth Truck Store. Input is welcome, needed and paid for at the rate of $5 per first received suggestion and $5 per review for a first received review of a book, periodical or hardware item.

Don Marler
Richard Merrill
Chuck Missar
Tom Gage

Energy Primer
c/o Whole Earth Truck Store
558 Santa Cruz Avenue
Menlo Park, CA 94025
(415) 323-0313



Solar Cooker

Dear Ones:

These solar cookers work better than I ever thought they would. I use one just about every time the sun shines, right here in Minn., in the middle of winter, in a sunny window. They work indoors as well as they work outdoors. We have parts or complete cookers for sale:

Steel parabolas (without reflective surface) 48" dia.— $28.00. Weight— about 35 lbs.
Aluminum parabolas (without reflective surface) 48" dia. $36.00. (8" deep)
Aluminum parabolic reflectors with mirror finish— $65.00. (8" deep)
Complete solar cooker with 48" aluminum reflector— $95.00.

You might tell your readers to save any broken mirror they might find. It makes a good reflective surface. We have been using a 3M product called "Scotcheal" that is supposed to be weatherproof and guaranteed for 5 years of outdoor use. So far it has worked good. There are other materials available that can be used.

Terms are cash. F.O.B. MPLS.

Best of luck with your Epilog,

Don Johnson

P.S. The complete cookers come with stands that can either stick into the ground or sit on a patio.

P.P.S. These cookers definitely have their advantages and disadvantages. They could be dangerous in the hands of small children just like a stove would be dangerous. They are not a toy and probably shouldn't be left out where children could play with them.

Order from:
Don Johnson
2523 16th Ave So.
Minneapolis, Minn.
55404

Has anyone used one of these damned things routinely? Are they any use?

—SB

Burning Wood

Two thorough studies "Wood as Fuel for Heating" and "Wood Fuel Combustion Practice" are available free from the University of Wisconsin (address below). A letter from Gordon Cunningham accompanies them...

Green wood does not burn more efficiently than dry wood:
- —the water must be driven out of a piece of wood before it will burn. That evaporating of water wastes about 1/5 of the wood you burn.
- —the water driven out of the wood cools the smoke, so burning "undry" wood is more apt to cause creosote deposits in the chimney than burning dry wood.
- —dry wood can be burned at a controlled rate if the heater or furnace air inlets can be damped tightly enough to limit air intake. In fact, the mark of an efficient heater or furnace is its ability to burn dry wood slowly.

The efficient wood-burning heater or furnace should have
- —a gas-tight fuel chamber (so the wood-gases which provide about 40% of the heating value of wood are forced to pass down through the red hot coals and be burned).
- —air is fed to the fire at the burning area, and to the extended flame path between the grate and the smoke pipe. The air inlets can be closed almost completely.
- —draft is thermostatically controlled.

Because all heater and furnace manufacturers pay my salary through their taxes, I cannot mention one over another. Therefore, I must ask that you write for literature and decide for yourself.

If I can be of further assistance, please do not hesitate to write.

Cordially,

Gordon R. Cunningham
Extension Forester
The Univ. of Wisconsin-U.S. Dept. of Agriculture
1630 Linden Drive
Madison, Wisconsin 53706

A PARTIAL LIST OF MANUFACTURERS OF "WOOD-BURNING" STOVES AND FURNACES

Ashley Automatic Heater Co.
P.O. Box 730
Sheffield, Alabama 35660
"Ashley Thermostatic Wood Burning Circulator"

Autocrat Corporation
New Athens, Illinois 62264
"Autocrat Thermo-Wood Automatic Wood Heater"

King Stove and Range Co.
P.O. Box 730
Sheffield, Alabama 35660
"King Automatic Wood Circulators"

Marco Industries
P.O. Box 6
Harrisonburg, Virginia 22801
"Fuel-Master", "Riteway"

Reeves-Bowman Div.
Cyclops Corp.
Dover, Ohio 44622
"Dover" and "Buckeye" Polished Tru-Blue Airtight Wood Heaters

Remember the Quench Water Purifier?

Hi!!

Delighted to hear about the renewed Whole Earth effort. That's my personal opinion. And, of course, we are pleased that our equipment will be listed in your next edition. We really don't recommend that anyone recycle their piss. It can be done, is pure, clean and sterile but it stinks.

Sincerely,

William J. Colson
Director of Marketing
Terraqua Products
San Pedro, California

Intermediate Technology

Intermediate Technology Development Group Ltd. will be publishing a new journal of **Appropriate Technology** beginning early in 1974. This quarterly journal will replace the previous Bulletin, and will carry regular features on the Group's ongoing projects in agriculture, building, chemical engineering, the organisation of cooperatives, forestry, sources of power, rural health, transportation and water technology.

Reports of new research and news of other international organisations involved in appropriate technology research and development will also be featured.

Members of I.T.D.G. receive the journal free of charge (cost of membership subscription is $8.50 per annum).

Contributions to the journal and enquiries should be addressed to:
Mr. Frank Solomon, Editor
Appropriate Technology
I.T.D.G.
Barnell House
25 Wilton Rd
London SW1V 1JS
England

(Suggested by Jim Harding.)

I.T.D.G. was founded by E.F. Schumacher, author of **Small is Beautiful***– the current book sensation of soft technologists.*

—SB

Craft

AN INTRODUCTION TO WOOD-CARVING TOOLS

BY BRUCE ERMAN

Imagine that the camping hike you've planned will be taking you through the famous site of the Fallen Tree-Trunk, where amateurs and professional wood-carvers alike have chipped away and added to an evolving sculpture for over 100 years!

Or, fancy carving an intricate pattern on the door of the main entrance of your own home, ornamenting a head-board for your bed— or even crafting an entire bed itself— posts, canopy, and all!

Whether you plan to spend only an afternoon carving during a camping trek, or devoting entire days to creating at your own workshop, the following information on shapes, sizes, and uses of the many available types of wood-carving tools will undoubtedly prove necessary to your basic selection of equipment.

Shapes, Sizes, and Uses

Wood-carving tools are usually measured across the widest part of the cutting edge (chisels, skews, gouges, fishtails), except parting tools, measured on one side at the cutting-edge. This width is called the "sweep."

A tool's name usually indicates its particular function.

PARTING TOOLS usually have either a 45^0 or 60^0 "V" shaped cutting edge. Naturally, the smaller the "V" the narrower the cut. Used for outlining, roughing-out (undercutting), and finishing inside corners.

VEINING TOOLS are the smallest sizes of straight gouges and have narrow but deep "U" shaped cutting edges for grooving and roughing-out small areas or lines.

FLUTERS (firmers) are straight gouges, larger and wider than Veining tools. Whereas the deepest "U" shaped cutting edges are for roughing-out, the flatter the edge, the more the tool is used for smoothing and finishing.

CHISELS have straight cutting edges occurring at 90^0 to the plane of the shank of the tool; their sweep ranges narrow to wide, and they are used for flat-cutting and finishing, as well as for sharp edges. The Macaroni (box) chisel has the shape of a square-bottomed "U" and is a specialized tool for straight-fluting and flat-cornering.

SKEWS are chisels whose straight cutting edge are ground at about a 45^0 angle and are excellent for cornering. They are available to skew-left or skew-right, depending on the type of cutting desired; and sweep is similar to straight chisels.

LONG-BENT GOUGES (curved-fluters) correspond to straight gouges given a concave curve along the length of the whole shank of the tool. Available in sweep narrow (veiners) to wide, and used for such purposes as roughing-out or hollowing-out. Long-bent chisels and parting tools are also available.

SPOON GOUGES (short-bent gouges) have a straight shank with a concave "spoon-shaped" crook, or bend, at the cutting-end. The sweep may vary from narrow to wide,

Box 428, Sausalito, California 94965

and from that of a parting tool to a veiner, straight gouge, chisel, or skew. Spoon gouges reach into roughed-out areas and hollows for the purpose of smoothing.

BACK-BENT GOUGES (short–) are like spoon gouges but have convex-shaped curves bending backward from the shank. Sweeps available from narrow to wide and also in chisel-form. Back-bent gouges are useful in clearing undersides and for making abrupt down-turns.

FISH-TAIL GOUGES resemble the posterior–, or tail-fin, of a fish. Available also as a chisel, and in sweep narrow to extremely wide, the latter size known as a "Swiss pattern-maker" tool. Without interfering with nearby edges, this tool provides clean cuts in tight or sharp corners and may also serve somewhat like a straight gouge. Also available in chisel form.

In general, sizes of tools, stamped-in on the shank or handles, give the radius of curvature. Tools of the same series or style number, although available in various sweeps, all possess the same radius of curvature: i.e., no. 4– 1/8"; no. 4– 5/16"; no. 4– 7/8"; no. 4– ½"– all curve to the same degree.

Thus, tools of flat– or lesser curvature have low size-numbers and make shallow cuts (finishing tools), while tools of greater curvature have higher size-numbers and make deeper cuts.

Choosing Tools

It is difficult for one to manufacture his/her own wood-carving tools. Therefore, it is often recommended that students, beginners, and elementary wood-carvers begin with "amateur" tools, which have shorter-length shanks than "professional" tools, supposedly making them easier to handle. These tools usually come in sets which are prepared with a basic and practical selection of straight chisels and gouges, accompanied by one or several parting tools, skews, long- or short-bent gouges, and spoon gouge. Mallet and sharpening stones usually are extra.

Professional tools, with longer shanks, allow more work to be accomplished at once. But usually, the sizes and sweeps of professional-length and amateur-length tools are identical.

Tools are variously honed and/or sharpened, depending on the specific make. Most often, the blades and shanks of the tools are full-finished clean and smooth.

Handles are usually of wood but are available in a number of styles: round; octagonal; squared, with angled-edges; handles with single- and double-hoops: usually a brass ring ferrule at one or both ends, to give added strength; plastic-ended handles, for added strength; leather-capped handles (again, for added strength); and plastic or rubberoid handles.

Angled-handles help keep tools from rolling, and the various types of special ends help the tool give extra wear by taking extra pressure.

Tools should be sharpened frequently.

The Mallet

Mallets are available in various types of construction, wood, and weight. Although lignum vitae is the heaviest, most popular of the hardwoods, several other types of hardwood mallets are available: Maple, Hickory, Boxwood, and Beachwood.

Mallets are usually hand-turned, and balanced. Many are solid-body construction, but some have separate, wedge-set handles. Mallets will be found available measured by the inch in diameter at the broadest end, by the ounce-weight, or by both. For example, a 2¼" Boxwood; a 1 lb. 9 oz. Lignum Vitae; a 16 oz. –3" White Hickory; a 15 oz. –3½" English Beechwood; a 24 oz. –4" Maple.

Some mallets are manufactured of carefully chosen dense wood cores which are laminated together and then lathe-turned, to assure a density of volume.

Smaller, lighter mallets are recommended for beginners, but the experienced wood-carver will probably have several mallets of varying weight and wood.

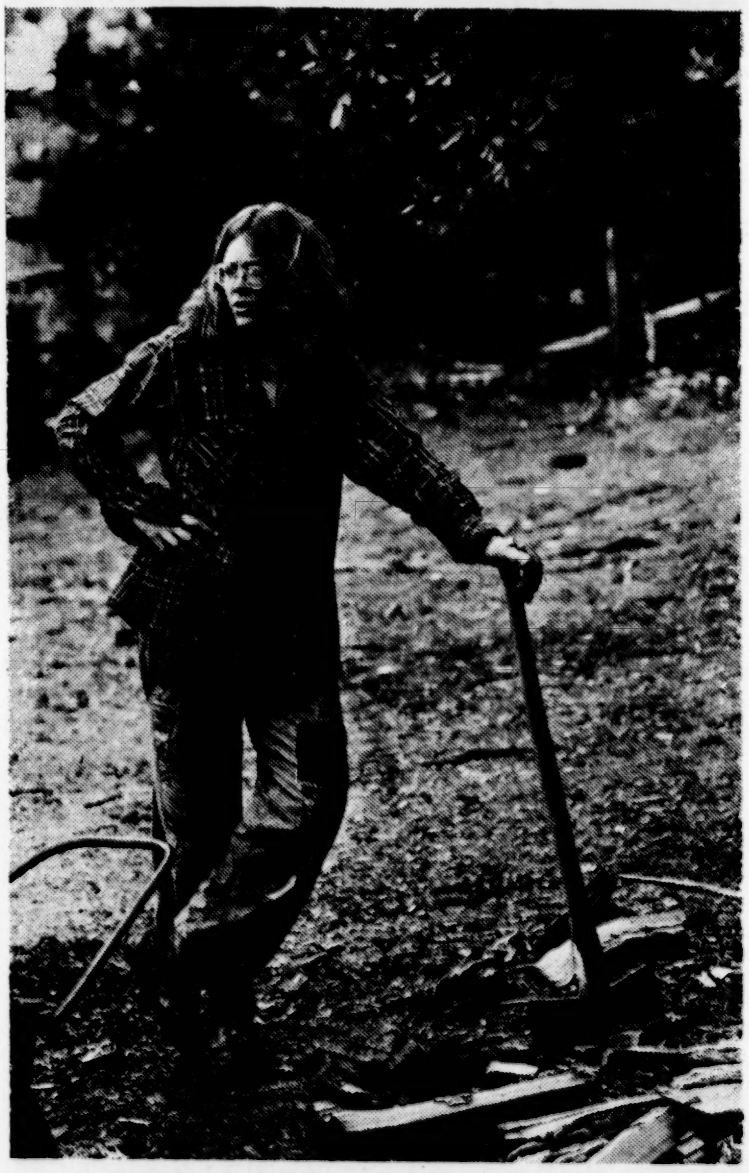
With this bit of introduction, more-and-more camping trails should begin to have sculptured trail-markers; more homes should abound with lovely, well-ornamented portals; and more-and-more amateur and professional wood-carvers will be getting a good night's sleep in beds they've crafted with their own two hands.

•

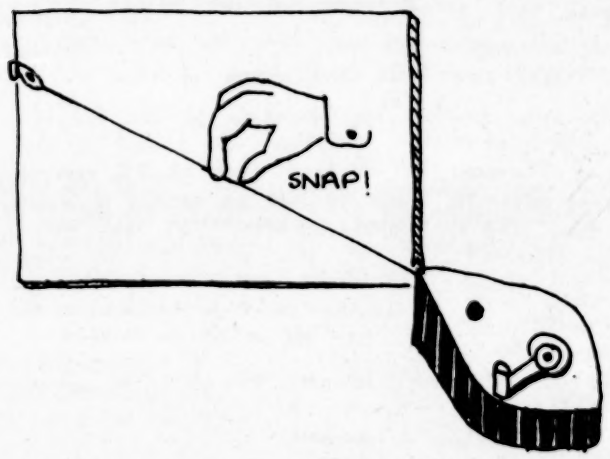
Written by
Bruce Erman
January 1974
c/o Dirty Rainbow
Artists' Materials
2514 Durant Ave.
Berkeley, Ca. 94704

MAIL-ORDER SOURCES

NAME & ADDRESS	BRAND NAME
1. Art Consultants 100 E. 7th St. NY, NY 10009	David Strassman
2. Buck Brothers, Inc. Millbury, Mass.	Buck
3. Dirty Rainbow Artists' Materials 2514 Durant Ave. Berkeley, Ca., 94704	Marples King (Sculpture House) Sculpture Associates
4. Ettl Studios, Inc. Ettl Art Center Greenwich, Conn. 06830	Henry Taylor
5. Frank Mittermeier, Inc. 3577 E. Tremont Ave. Bronx, NY., 10465	David Strassman
6. Sculpture Associates, Ltd. 114 East 25th St. NY, NY 10010	Sculpture Associates
7. Sculpture House, Inc. 38 East 30th St. NY, NY 10016	King
8. Sculpture Services, Inc. 9 East 19th St. NY, NY 10003	David Strassman
9. Heidl Slocum Co., Inc. 78-82 Reade St. NY, NY 10008	Henry Taylor
10. Stewart Clay Co. 133 Mulberry St. NY, NY 10013	Henry Taylor & domestic
11. Woodcraft Supply Co. 313 Montvale Ave. Woburn, Mass. 01801	Sorby Marples
12. Jack D. Wolfe Co. 724-734 Meeker Ave. Brooklyn, NY 11222	King



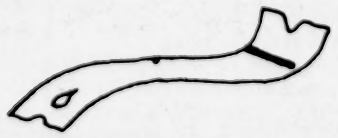
The chalk line is another tool of unlimited uses - as many as you can dream up. It's a string wound up in a container of chalk(refillable). Pull the string out, hold it tight at both ends, and snap it in the middle - an automatically straight line is marked for you. Good for marking a line to cut plywood, for example, especially if you have to cut an angle; or to put a mark to line up the bottom plate of your wall.



♀

WRECKING TOOLS also deserve a whole discussion. For one thing, they're useful in ways besides tearing things apart or down. For example, when you're working alone, pry bars are handy as shims or leverage, holding something up until you get it nailed. Besides crowbars of various shapes and sizes, I'd like to mention 2 other wrecking tools.

The wonderbar is indeed a wonder, with many applications and advantages. "Wonderbar" is a trade name (it goes by other names too) for a small, flat prying tool. It's easy to handle, not burdensome to drag around like a crowbar, and it fits on my tool belt. Never-the-less it is good at prying, nail pulling, even crude chiselling. It's my favorite and most often used wrecking tool.



The Cat's paw is especially designed for digging out nails which are sunk too far into the wood to reach with a hammer claw or crowbar.

hit here with hammer, causing the paw to dig into the wood under the nail head

leverage on the handle then begins to pull the nail out. Do the rest with a hammer or crowbar if you prefer.

Country Women

This good little magazine has so much country how-to we almost put it in the Land Use section. Land Use for Woman Freedom is what it is.

—SB

Country Women

$7/yr (every 6 weeks)
from:
Box 51
Albion CA
95410

Noise

To my mind our most serious environmental problem today is NOISE! It is easy to verify that the level of noise pollution is much higher than, say, air pollution. Go where the traffic is light so that cars are at least a block apart. See how far you can smell a car. You will probably be surprised at what a wide belt of stench a car makes. But now see how far you can hear a car. You will find that the area covered by the noise of a car is vastly greater than the area covered by the stink of a car. Practically no one is so much of a boor that they would not be aghast at the idea of walking into a house where someone they didn't know was sleeping, and giving the sleeper a poke in the ribs — yet almost everyone would think nothing of driving past that persons house, and the houses of hundreds of other strangers and doing the acoustical equivalent. Just one more indication of how serious the noise problem has become — In the fall of 1968 the hearing of incoming freshman was tested at the University of Tennessee. It was found that 32.9% required sounds to be over 30 times as loud as normal in order to hear them. This so shocked the experimenters that they repeated the experiment the next fall. This time they found 60.7% of the students with hearing more than a factor of 30 below normal. Now loss of hearing cannot be considered as the most serious effect of noise — only the easiest to measure.

After this preliminary let me get back to recommendations:

3 books, all available in paperback:

THE FIGHT FOR QUIET
Theodore Berland
Prentice-Hall, Inc. $2.95

THE TYRANNY OF NOISE
Robert Alex Baron
Harper & Row $2.75

These are both excellent books, explaining why noise is a problem, and what to do about it politically.

NOISE
Rupert Taylor
Penguin Books $1.85

An introduction to the technical side of noise, explaining what can be done physically to reduce noise.

I would also like to recommend supporting two organizations which are doing something about noise:

C.A.N. citizens against noise
2729 W. Lunt Ave.
Chicago, IL 60645

The organization started by Berland.

PROJECT QUIET CITY
sponsored by Citizens for a Quieter City, Inc.
The American Red Cross Building
150 Amsterdam Ave.
New York, NY 10023

Baron's group.

Speaking of organizations to support, none will give you more results for your dollar than

Highway Action Coalition
P.m 731
Dupont Circle Building
Washington, DC 20036

You can thank them for the fact that Highway Trust Funds can be used for mass transit. And they did it on a budget of $39,000/year. Fantastic!

Welcome back. I hope the EPILOG turns out to be a satisfying project.

Craige Schensted

Express Mail

If you are as bad about meeting deadlines as I am, or if you live in a perpetual state of last-minute, or if your lover lives in San Francisco and you are in Manhattan— the U.S. Post Office Express Mail Services might be just what you need.

It works like this: bring your letter, or package, to the Main Post Office by 5 P.M. and it will be delivered to the Express Mail window in the Main Post Office of the city of your choice by 10 A.M. the next morning.

It's up to you to notify someone to pick it up.

A regular letter is $1.50. For an additional $4.00 the Post Office will deliver it to the addressee.

There is Express Mail Service between 39 cities.

—Rick Fields

New Games T-Shirt & Film

Last Fall a **New Games Tournament** *was held in a wild valley just north of the Golden Gate Bridge in Marin County— 2 weekends of Boffing, Slaughter, Earthball, New Frisbee, Hang-Gliding, Capture the Flag, Valley Volleyball, Standoff, LeMans Tug-O-War, Pong Doubles, Gotcha, Yogi Tag, Aikido, etc.*

An excellent film was made by Tom Schneider— "The New Games Tournament", 20 min, 16mm, color/sound. Rentable for $25 from: POINT, Box 99554, San Francisco CA 94109.

Available to buy are New Games Referee T-Shirts with official Hog Farm motto. Sizes: Medium, Large, Extra-large (no children's sizes). $2 postpaid from Box 428, Sausalito CA 94965.

Another New Games Tournament at the same location is being organized for mid-May, 1974.

—SB

Mailorder Porn...

In keeping with the section on sex which Salli Rasberry (not pictured) is researching for the next CQ and the EPILOG, we would like advice on what are the best mailorder sources for pornography– high quality, low cost, etc.

–SB

Wheat

You can't store flour very well, but you can store wheat berries and grind flour when you're ready. Ted A. Whitmer & Son told us they were out of wheat but suggested these alternate sources– some new ones since CATALOG days.

–SB

The Corners of the Mouth
1413-1419 Cambridge St.
Cambridge, Mass. 02139

Erewhon Trading Co. Inc.
33 Farnsworth St.
Boston, Mass. 02210

Walnut Acres, Inc.
Penns Creek, Pa.
17862

Laurelbrook Foods
P.O. Box 47
Bel Air, Md. 21014

The Good Life
78-80 Main St.
Brattleboro, Vt.
05301

Food for Life
420 Wrightwood Ave.
Elmhurst, Illinois
60126

Magic Mill, Inc.
235 W. Second South
Salt Lake City, Utah
84101

Erewhon, Inc.
8454 Steller Drive
Culver City, Cal.
90230

The Food Mill
3033 McArthur Blvd.
Oakland, Cal. 94602

Janus
1523 Airport Way South
Seattle, Wash. 98134

Hot Box

Dear Whole Earths:

One of the oldest (and best, cheapest) methods for conserving energy in the kitchen is the use of what is alternately called a HAY BOX or a HOT BOX. I described it in my book, **Manna: Foods of the Frontier** and long before me it was described, very briefly, in **How to Eat a Wolf** by M.F.K. Fisher (hints during world war II).

I had one made up recently for demonstration in a lecture on that subject (hints for saving energy, time, etc in the kitchen) and feel that although it was commonplace on farms until not too long ago, it is virtually unknown now.

Would you like to see it? Hear more about it? I first encountered it– physically in use– on a houseboat I lived on in Holland, where everyone uses them. It is, in essence, a box within a box and separated by some form of insulation: hay, newspapers, straw, etc. Partially cooked food is set within it and left until wanted– its as simple as that.

It occurred to me that this might be of value in such a book as your's.

Very sincerely,

Gertrude Harris
Pt. Richmond CA

Enclosed copies of those pages in **Manna: Foods of the Frontier.** Should you want the entire book, write: 101 Productions, 834 Mission St., San Francisco, CA 94103.

THE HOT BOX

Most soups and stews are improved when the component flavors are blended in long, slow cooking. To achieve this with a minimum of watching and worrying, the "hot box" came into being. It was a fuel saver (not a small consideration) and, in summer, helped keep the kitchen cool and release the range for more vital chores. After the food has been brought to a boil and cooked for about an hour, it is put– pot and all– into the hot box and left to simmer in its own heat until wanted. If properly made and airtight, the box should hold heat well for at least 12 hours. All country people know its value and it is internationally used.

I first actually saw a hot box on the barge of the Dutch sculptor, Paul Koning. His was made of two wooden packing boxes, one inside the other, the outer being about 4-6 inches larger than the inner one with a layer of cotton batting (unsterile absorbent cotton) carefully stuffed between them; in all, it was about 18-20 inches square. The lid was the fourth side of each box, carefully nailed together with a space between holding more cotton batting and attached by a hinge to the box itself. He used it mainly to cook rice– which he cooked every single day– but also, on occasion, to "finish" his soups and stews.

Report from Stephen Gaskin Farm

Dear Stewart,

Day before yesterday I saw a thing in some beatnik press that you and Diana were doing a **Whole Earth Epilog**, and last night I wrote you a letter to let you know what we're doing here and see if you were interested. Then I got your form letter about updating the Last WEC. We talked about it with the folks who do the print shop, and we thought we could send you a camera-ready page if you'd like us to.

There's about 680 of us here now, on about 1750 acres, and we're still growing and learning more and more about how to do it. Stephen and the Farm Band have been out on tour to most of the big cities, and it feels like our thing is starting to spread out some. We've done two books— **Monday Night Class** ($1.95) and **The Caravan** ($2.95); two records— **The Farm Band** double album ($5) and **Up in Your Thing** ($3); four cassette tapes of Stephen's gigs ($3 ea); and our hot new item is **Hey Beatnik! This Is the Farm Book** ($1, 104 pp., 150+ photographs). All from The Book Publishing Company, The Farm, Summertown, Tennessee 38483. **Monday Night Class** is available from Book People or us.

We were thinking that this is a good time to be doing a Whole Earth Epilog thing— it looks like there's a huge depression coming, and folks are going to need to know how to make it on their own. Stephen says the depression is going to be complemented by a huge spiritual renaissance, because as people lose their shirts, they're going to have to cop to God.... There've been times when it was just the monasteries that were making it.

Since I saw you I've gotten married to a lady named Kathryn and had a daughter named Grace who's 18 months old. Kathryn's a nurse and one of the Farm's midwives. We've delivered about 140 babies in ladies' homes— and we have some evidence that home deliveries are actually safer than hospital ones. Our local doctor thinks so and wants to do a paper for the AMA on us. (He already did one on the Amish and their home-delivery trip.) **Hey Beatnik!** has about 18 pages devoted to Spiritual Midwifery that tells folks what delivering babies is about. Along the same lines, another page says HEY LADIES! in red white and blue letters and goes on to say, "Don't have an abortion, come to the Farm and we'll deliver your baby and take care of it, and if you ever decide you want it back, you can have it." We believe in coming on as strong as we can in favor of life force. We've had a couple of ladies come already who had been going to have abortions, and after they had the baby they decided to keep it.

I keep wondering how you're doing and where you're at. I run into bits and pieces through **Place** and through friends, but all the solid information is a monk's robe and a divorce, and now Whole Earth Epilog. I'd dig to stay in communication with you.

And we'd dig to stay in communication with your readers, so we're going to start working out a page's worth of stuff for them. Let us know how much you think you could use. We've got a really far-out print shop: composer, copy camera, two darkrooms (one for 35mm b&w & color and one for the copy camera), two printing presses, cutter, folder, binder. I helped set it up some and worked on **Hey Beatnik!** for a while, and then I got into doing carpentry, so I'm working on building houses. Learning a whole bunch of stuff and having a really good time.

If you're ever out this way or want to be, come see us.

Love,

Matthew McClure
The Farm
Summertown, TN 38483

Matthew (he was Cappy then) used to set type for Whole Earth.

Report from Auroville,

dear wavey gravey, after more than two years of careful consideration i think that i have hit upon a solution to the "what to do with twenty thousand dollars" contest. i have been out of the states a couple of years now but i remember the party in san francisco and the last i heard was that no winner had been picked.

my idea is this: to establish THE LIBRARY OF THE WHOLE EARTH in Auroville India, housed in a dome in the center of Auroville with reading rooms, drafting tables, etc. Access to graphic tools for the citizens of the world.

what is Auroville? it is a new inter-intra national city being built in the middle of a desert in South India near the old french territory of pondicherry. It has been sanctioned by UNESCO when it was founded in 1968 but is best explained as the vision of Sri Aurobindo and the Mother: a new city free from international rivalries and internal politics, the site of material and spiritual researches into an actual embodiment of human unity, a place for man to seriously attempt the beginning of the reorganization of the earth and mankind in a rational and logical manner. it is a commune which escapes the limitations of exclusiveness, the mantram of Auroville is TRUTH, AT THE SERVICE OF TRUTH. The yoga of Aurobindo and the Mother is unique in that it is no RELIGION, no priests, no rituals. It is not the escape from this world into nirvanic states, it is here and now— do it while you can. It is good in the yoga to organize a little of the physical mater around you. the signifigance of this physical existance in this lifetime is that this is the only field where change is possible, progression, evolution... a new man(kind).

we are less than 300 in number. mostly we live in temporary bamboo structures. our work is agriculture, afforesstation, village handicrafts, printing, handmade paper, polyesther, geodesic domes, ferro-cement fishing vessels, solar energy and methane gas production, woodworking and furniture, metal working, windmills and borewells, soil rehibilitation and erosion prevention, health and medical care in rural villages, fishing and "sea spam", crystaline structures and moghul tombs, children and education, computers and systems analysis, tetrahedrons and vector equilibriums, running, laughing, playing and building a new city from scratch.

what we need are books, DON'T SEND MONEY, JUST SEND BOOKS. the information is there, let us share it.

at the service of truth

Eric
Auroville India, Sept. 1963

Nomadics

Soaring

Dear Mr. Brand:

Thank you for taking time on the telephone last week to discuss soaring lithographs and books.

Enclosed, as promised, is a complete set of my soaring lithos, gratis. They are sold for $5 each and are available direct from me or from Rainco, Inc., Box 20944, Phoenix, Arizona 85036 (later referred to as Rainco, a major source for soaring materials).

Interesting books for you to advise your readers about:

Pilots' Weather– By Ann Welch, published by John Murray in London, available in the U.S. from Rainco. An absorbing and fully illustrated treatise on soaring meterology from the ground and the cockpit. An absolute 'must' for pilots. $12 I think (it's £4.50 in England, where I got my copy).

Fundamentals of Soaring– By Derek Piggott, due to be published this Fall by John Murray. Piggott is one of the most famous glider pilots in the world and this is the definitive pilot's text on the behaviour of airframes and how to control them.

Free as a Bird– By Philip Wills, ex World and British Soaring Champion. John Murray again (home office address is 50 Albermarle Street, London W1X 4BD), and price will be around $10 from Rainco. Outstanding review of gliding progress since WWII in Europe.

The Art and Technique of Soaring– By Richard Wolters. McGraw-Hill, $15. A fully illustrated text showing virtually every aspect of learning to fly sailplanes, mostly the Schweitzer 2-33. Available from Rainco or the Soaring Society of America, or the local bookstore if you're lucky.

On Quiet Wings– By Joseph Lincoln. $30 from Rainco or the SSA. A full anthology of gliding flight since the first time man tried to get off the ground with wings. Beautifully produced and illustrated, and featuring most of the worthwhile authors on gliding who have ever put pen to paper.

Gliding (A Handbook on Soaring Flight)– By Derek Piggott. John Murray didn't do this one; it comes from Adam and Charles Black in London, and is available from Rainco for $10. Good basic text.

New Soaring Pilot– by Ann and Lorne Welch and Frank Irving. John Murray, but available in the U.S. through Rainco for $10. An excellent introductory book on soaring up through the beginnings of competition flying.

Meteorology for Glider Pilots– By C.E. Wallington. Another John Murray book, available from Rainco for $10 approximately. This is the basic scientific text on aviation weather with emphasis on gliding. Fully illustrated and documented, but rather hard going for the layman.

Pilot's Choice– By Gren Seibels. $6.95 going up I think to $7.50. Published by Soaring Symposia, 408 Washington St., Cumberland, Maryland 21502. Utterly delightful account of a pilot who turned from noisy powered aircraft to the delights of soaring, and his many adventures. Well written, witty, delightful fun and authentic with a notable absence of 'gee whiz'.

The above is a very small sampling of current books. In the summer I'll be publishing a book consisting of the collected writings of the new World Soaring Champion, George Moffat. It'll be $5, paperback, and will probably be entitled **"Winning"**. The Soaring Press, at my office address.

There's a local gliding organization that welcomes hang glider and soaring pilots. It's PASCO, the Pacific Area Soaring Council, and annual dues are $5. Membership chairperson is Jane Herold, 966 Astoria Drive, Sunnyvale 94086. An excellent monthly publication called "West Wind" and year-round gliding activities throughout the West.

I hope I helped a little. This is just a very tiny sampling of the available materials, that include sailplane models, maps, training data, etc. The Soaring Society of America is a very good source of information, and they are always interested in helping.

Best wishes on your new venture.

John Joss
Box 960
Los Altos, CA
94022

Knives

Hi again—

Got to thinking that sense you printed our brief words on knives in an Early Whole E Catalog Suppt maybe I should send a few more words—

Its pretty hard to judge a person without seeing some 'deeds'. I have long had a higher opinion of anyone Ive run across who carried so much as a pocket knife. people who carry knives are 'doers' and I have found they can usually do more than lay a good story on you.

The knife is still the basic tool of civilization and never before have so many good and so many bad knives been available.

Regardless of price I have found cutlery generally falls into two catagories. Either the blades are of stainless steel which makes them rustless, but hard to sharpen. or they are of high carbon steel which is easy to sharpen, takes a very keen edge, but must be sharpened a little more often.

A good many butchers and outdoorsmen wouldn't take a stainless knife as a 'gift' but some of the newer 'sandwitched' blades and more expensive alloy steel blades seem to take and hold a pretty fine edge.

Some pocket knives are easily lost. I have seldom felt that an expensive pocket knife was worth the cost for utility usage, and oddly enough the american alloy blades are still by far the 'best of the bunch' in economy knives. A typical american blademaker 'Collins' has made over 400 types of machetes to furnish the peoples of the worlds back countrys. They sell millions of them yearly and no self respecting latin who lives with his blade would carry an inferior Japanese product.

As the Second World War came there was only one good custom knifemaker to supply servicemen with fighting knives. Randall Knives were the best and only until a little after the Korean War. At this time such a demand grew that custom knifemakers all across the country began sprouting up. As this is written there are around four dozen custom knifemakers and they turn out just about any type of blade and knife imaginable. With a few exceptions a person will be able to get the best of designs from any of these craftsmen for 40 to a hundred dollars and since the list of knifemakers is long and changing it is advisable to send 25 cents to Russell, Box 474, Fayetteville Ark, 72701 for a current list of members of the Knifemakers Guild... If a knifemaker can't put out quality work he doesn't make this list. To get a good solid knife on a bare budget is usually no more difficult than getting a high carbon steel bladed butcher knife and grinding it to ones favorite shape. I have a friend missing a little fingertip who prefers a tang on his knives and I prefere almost no tang. Whatever a persons taste there is now a knife to suit them.

In freedom

Al Fry
Perris, CA

Sail your guitar to Michigan

dear whole earths,

i heard that you are contemplating another last last catalog. if so, that's good. it'll be fun to use. if not, that's okay, too.

anyways if it's true, here are a couple things which you might or might not want to include.

if you intend to include the blurb on wharram polynesian catamarans again (it's a good thing to have in. ours is turning out beautiful and wharram is really into a healthy service-for-artists anti-bigcorporation thing) be sure to give wharram's address instead of the address you gave on p 294 of the last catalog. wallace cookson is no longer wharram's agent and is ripping him off. the accurate address is: james wharram, the longhouse, milford docks, milford haven, pembs., s. wales, u.k. while building our catamaran, we ran across another worthy product: aerolite powder glue. wharram suggests use of this stuff and so we bought it on his recommendation. the only place to get it in north america is: leavens bros. ltd., 3220 dufferin street, toronto 390, ontario, canada. this is about the most rank stuff to work with i've ever heard of. but it is STRONG. we've made mistakes in our building and when we try to take apart a well glued joint the wood breaks before the glue gives. it comes in two parts: a powder (which you can store forever) which mixes with water to make this gooey, sticky glue, and a liquid hardener which burns if it gets on your hands and is likely to knock you out if you take a deep breath of it. you just spread a little of the glue on one piece of wood (or metal, or whatever) and a little of the hardener on another and clamp them together. we use it for everything now. it is a super glue and costs only a fraction of what epoxy costs. we wear rubber gloves to keep it off our hands and, if we're in an enclosed space we wear bandannas over our mouths to screen out the hardener. they have different hardeners to fit any climate. we bought a 100 lb. drum of powder and a 50 lb. drum of low temperature hardener. we are only about half through it now, but i'd estimate that the powder probably mixes into 30 or 40 gallons of glue. epoxy costs 25 dollars per gallon. we paid $145.00 for our aerolite, shipping and import duties included. a little under $5 per gallon. good stuff.

also for sailors: vancouver sail supply ltd., 6825 granville street, vancouver 14, canada, gets their sails from hong kong. if you don't mind waiting for 6 months, you can get sails at ½ the price you pay with any american maker. write to james vittrey.

one more thing: probably the finest guitars (classical) being made anywhere in the world can be got from richard schneider, luthier, of 17340 harper ave., detroit, michigan. this guy is a very small-scale business and is definately not for the brochure freak (he most likely doesn't even have one), but the guitars he makes are absolutely astounding. he doesn't have a team of lackeys building his instruments for him like gurian does so he can only get out a few guitars a year. he's been working with an acoustical physicist named michael kasha, and together they have revolutionized guitar construction. few people realize what a poorly designed instrument the guitar is. it is only 3% efficient. 97% energy waste. anyhow, kasha has redesigned the whole instrument: revolutionary divided bridge, incredible struts in on the inside of the sound plate, inertially weighted head, sequoia sound board (rather than the standard spruce which, after 4 or 5 years of hard use is shot. sequoia lasts and improves for 200 years), are just a few of the changes he's introduced and which schneider builds into his guitars. the instruments are not cheap. the latest one, which has been acclaimed by the few people who have seen and heard it as the greatest guitar ever built, sold for $5000, but, then, some violin players have paid 10 grand just for the bow. in any case, if you are interested in owning one of the finest instruments in existence, visit schneider. if you really want quality, he will surpass your wildest fantasies.

thanks much for providing our most useful and favorite tool.

merry christmas and
hunter's welcome,

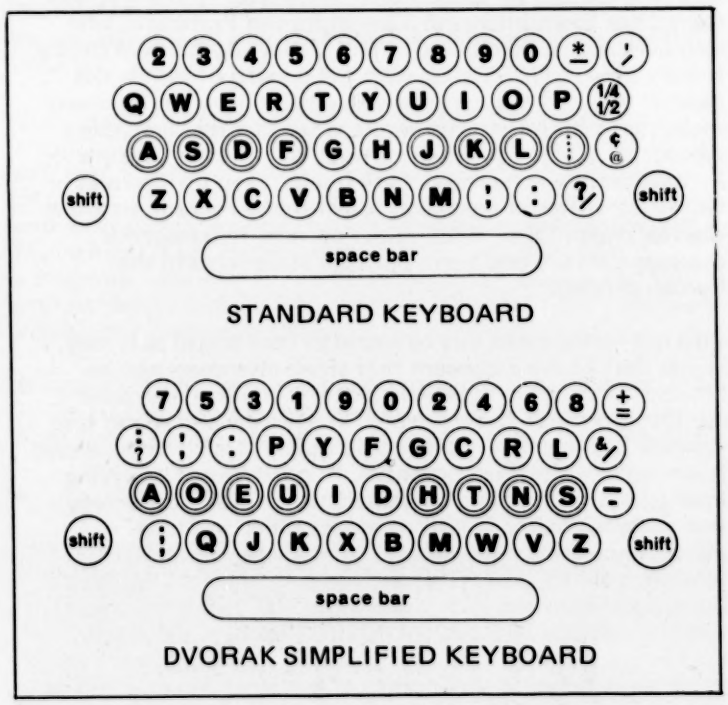
pammy and bau graves
grand haven, michigan

Communications

Beyond Hunt-and-Peck

Back in 1873, when the first typewriter appeared, the average typist found that he could type faster than the machine could respond mechanically. As a result, the typewriter keyboard was deliberately designed to slow down the typist, thus keeping the early machines from jamming. For a century, we have used a remarkably inefficient typewriter keyboard.

Back in 1932, Dr. August Dvorak redesigned the keys after years of exhaustive study— so exhaustive, that modern computer technology is unlikely to improve on Dvorak's keyboard— and announced his findings to the world. The world promptly forgot all about him. The patent on his keyboard finally lapsed, and only a few of the best-informed typewriter salesmen even remember his discovery. Nevertheless, it is possible to special order a typewriter (with a fantastic amount of trouble and confusion among local salesmen and the home branch of the typewriter company) equipped with a Dvorak Simplified Keyboard, or DSK.


2 3 4 5 6 7 8 9 0 * '
Q W E R T Y U I O P 1/4 1/2
A S D F G H J K L ; ¢
shift Z X C V B N M ; : ? shift
space bar
STANDARD KEYBOARD
7 5 3 1 9 0 2 4 6 8 + =
P Y F G C R L
A O E U I D H T N S
shift Q J K X B M W V Z shift
space bar
DVORAK SIMPLIFIED KEYBOARD

Statistically, the keyboard allows amazing feats. In the early 1940's, one professional typist achieved an unofficial speed of 180 words per minute on a manual machine. Virtually all the international records for typing speed in the 1930's and 1940's were set on Dvorak-equipped machines. Most people can master the system in a month or two. When fourteen Navy women typists were retrained on DSK machines, within one month they were turning out 74% more work with 68% greater accuracy. (Part of this improvement may have been due to the fact that they knew they were participating in an official test. This always increases efficiency.)

How great an advantage is a Dvorak machine? A professional typist moves his or her fingers over an incredible amount of distance in one day's typing— between twelve and twenty miles! With a Dvorak machine, this movement is reduced to one mile. About 70% of all typing is done by fingers on the "home row" of keys with DSK's, and work is distributed rationally among the various fingers. Fatigue in typing is drastically reduced. As the U.S. Bureau of Standards concluded in 1965: "...there is little need to demonstrate further the superiority of the Dvorak keyboard in experimental tests. Plenty of well-documented evidence exists." (The whole story can be found in the "Science" issue of **Saturday Review** [Oct., 1972] in an article by Charles Lekberg, "The Tyranny of Qwerty.")

Dvorak has written an excellent typing manual, Synergistic Typing, available for $12 from Motivational Communications Corp., Etobicoke, Ontario, Canada. In California, the man who has really pushed for the DSK system is Robert McCauley, who runs a T.V. repair shop in Pasadena. His twelve-year-old daughter once hit 125 words per minute in a controlled test.

If you never learned to type very well, and you're willing to wait for a specially ordered typewriter, several of the manufacturers can supply them (Smith-Corona, IBM Model D). If people would ask for it, maybe IBM would make a DSK ball available for their Selectrics. The same goes for Olympia's new ball typewriter. Drop them a note. (IBM: Parson's Pond Dr., Franklin Lakes, New Jersey, 07430; Olympia: Box 22, Summerville, N.J., 08876.)

Gary North
Long Beach, CA

Aw, Blackwells

Blackwells, the lovely British book distributor so reliable for low-cost mailorder books, has lost its price advantage for American buyers because of the current apocalypse in Merrie England. So says Bill Butler of Unicorn Press.

—SB

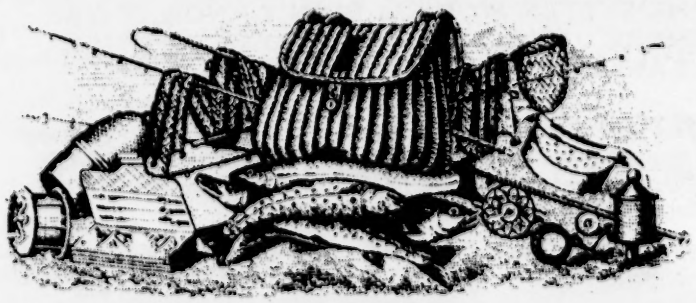
Nice people at the publishers sometimes send letters with review copies of books.

Dear Epilog:

I don't know who the trout junkie is on your staff, but you can tell him this is all he gets from us. We're no suckers.

Yours truly,
Jerry Hoffnagle
Crown Publishers
NY

P.S. My brother just had another baby. His wife did, that is.



Your Own Satellite or Conference Line

MIKE PHILLIPS
TO: STEWART BRAND
RE: COMMUNICATIONS IN EPILOG

YOU CAN STILL MENTION THAT READERS CAN BUY A SATELLITE LAUNCH FROM NASA BUT A BETTER SOLUTION IS TO GO THRU RCA. A LAUNCH COSTS $8 MILLION AND THE PAYLOAD IS 2,000 LBS IN SYCHRONOUS ORBIT AT THE EQUATOR (FOR DETAILS BILL BROOK, RCA SATELLITE DIV. 609-799-3030.)

RCA USES A CANADIAN SATELLITE NOW AND WILL HAVE THEIR OWN BY THE END OF 1975. THEY CHARGE $1600 PER MONTH, FOR A TWO-WAY VOICE GRADE CHANNEL FROM ANYWHERE THAT THEY HAVE A SITE ON THE GROUND TO ANY OTHER ONE THAT IS WITHIN DIRECT LINE WITH THE SATELLITE OVER BRAZIL; IT IS YOUR OWN DEDICATED CHANNEL. FOR PRICE CONFIRMATION: RCA, WALT PIOLI 408-732-4000. A SINGLE CHANNEL WOULD COST $800 PER MONTH, (LIKE A TAXI-CAB).

AT PRESENT THERE AREN'T TOO MANY GROUND STATIONS, YOU CAN BUY YOUR OWN PORTABLE ONE. SOURCE: CALIF. MICROWAVE, SUNNYVALE. THEY HAVE A 40LB TRANSMITTER WHICH WORKS ON 110 VOLTS FOR $12,000 TO $15,000. CHECK WITH STEVE ERICKSON 408-732-4000.

ENCLOSED IS THE BROCHURE ON THE DEVICE TO CONVERT A MULTI-BUTTON PHONE INTO A CONFERENCE CALL SOURCE. IT WORKS WELL, I'VE USED IT MORE THAN A DOZEN TIMES; COSTS $70, TOOK IT APART AND FOUND THAT IT IS MOSTLY SOLID STATE WITH A SMALL TRANSFORMER AND SEVERAL SWITCHES.

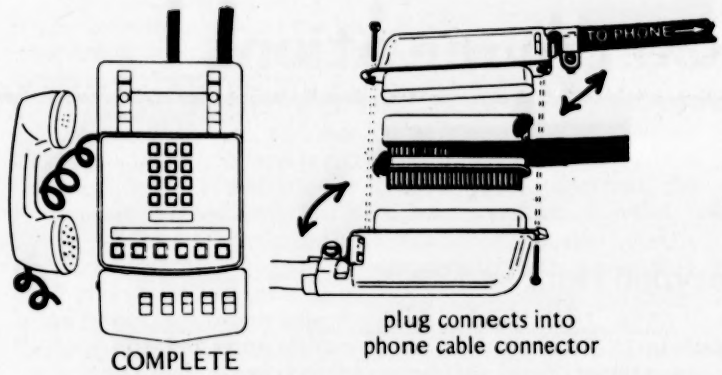
IT HAS HAD A CONCEPTUAL EFFECT ON ME BUT I'M NOT CLEAR ABOUT IT YET. I OCCASIONALLY INTRODUCE PEOPLE TO EACH OTHER THAT WAY AND SKIP DOING IT OVER LUNCH; SMALL MEETINGS OF 2-3 PEOPLE ARE AVOIDED ABOUT 40% OF THE TIME, ALMOST CERTAINLY IF LONG DISTANCE TRAVEL IS INVOLVED.

LOVE, THE END
VOICE GRADE CHANNEL FROM ANYWHERE THAT THEY HAVE A SITE

ENCLOSURE:
P.S. SORRY ABOUT THAT LAST LINE, THE WAY THE SYSTEM WORKS I DIDN'T KNOW IT WAS THERE UNTIL I PRINTED IT OUT, I'M STILL LEARNING.

(The do-it-yourself conference caller is a wonder. You need a multi-button phone to use it. It's called the ACCURATE 500, obtainable from Accurate Merchandising, Inc. 400 Madison Ave, New York NY 10017.)

—SB



COMPLETE

plug connects into
phone cable connector

Video Synthesizing

Dear People:

I am not sure why I am writing except it must be important for me to share some thoughts with you.

I guess I have a concern that the proposed resource manual (where it will delve into the regions of video and list such publications as Radical Software, Guerilla Television, Expanded Cinema etc.) should also review two other documents to be shared with your readership. I mention these two because Shamberg and Youngblood have missed a part of video in their respective books. The books I refer to are **Videospace** and **Videospace and the Image Experience.** Both are written by Brice Howard, Director of the National Center for Experiments in Television, San Francisco, who also lives as a human being in Mill Valley. By his own choice, Brice's time at NCET ends with the passing of March this year. If you or your contributing editors have not reviewed these two documents, the whole video process, and where we can be going with video culture, will be sadly lacking. Perhaps someone has read these books, been an intern at NCET, or visited the place at Seventh and Folsom, to know the real potential of video in our culture. It transcends message delivery and socio-political statements in the human process.

I do not really mean this to sound as hard edged as it may, it is just that I have a concern that video awareness not be limited for people...especially since the notion of artistic composition with the electronic image flow and sound is so delicate in the balance, and could quickly be commercialized resulting in unfulfilled potential. In other words, studying how television's unique characteristics of electrical energy, two dimensionality in a fixed aspect ratio, and time-dependence are applied in studies of shape, movement, tension, volume, plasticity, texture and duration. We have been experimenting with video using high technology gear (color broadcast without transmitter) for over six years here at super school. Without dwelling on the subject, I will share some newspaper clippings of our most recent effort at awareness. Videospace mixing, when it works, is unique and is not photographed reality.

One other thought, we are exploring the use of image in human personality assessment. Heavy words which simply mean trying, with the use of images, to help someone else get their shit together, if such is the need. I would be interested in your feedback to this written stuff, or maybe I could contribute some written stuff and see if I can give more than lip service.

Take it with peace.

Cordially,

Jno F. Moormann, Jr.
Assistant to the Director
Broadcasting Services
School of Fine Arts
Southern Illinois Univ.
Edwardsville, Ill. 62025

Learning

Bhagavan Das, ah

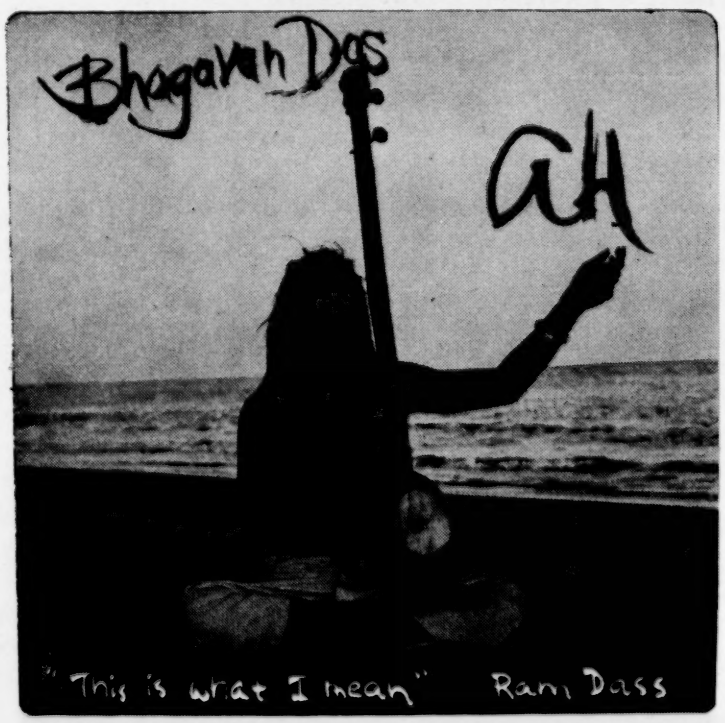
Chanting is singing, but with a difference. It is singing in the rain. Most chanting is marked by a repetition which is the repetition of rain drops, again and again, the same space, utterly natural.

There's no such thing as good or bad chanting. It's all a process you go through, riding the horse of your breath. Bhagavan Das rides his for all he's worth— horse and rider galloping as one.

Even so, for all Bhagavan Das' expert surrender to his breath, his bells, his tamboura, it is necessary to approach this album as participant rather than as passive listener. If you take it as chant-along-with-Bhagavan record, it leads you to open your own mouth wider than you ever thought possible. If you listen passively, all you might hear is some guy with a belly-ache.

This record offers two kinds of chanting, free form and traditional Hindu and Tibetan. In free form you just open up and wail or whisper, like an ocean or a blade of grass. Most of us never consider this way of chanting, but it's the easiest and most direct. At first there is embarrassment, strain. But if you keep it up, long enough to bore your boredom, something— the wall of self-consciousness— breaks and fills you suddenly, inch by inch, with an immense roar: your own voice, your own belly-ache.

Bhagavan Das learned his music during years wandering India. He is a blond surfer from Laguna Beach, who turned Ram Dass (Richard Alpert) on to his teacher. "I met Bhagavan Das in 1967 in the Blue Tibetan restaurant," Ram Dass writes. "He was an extraordinary being to look at, first because he is six feet seven and had a huge juta braids of hair piled on top of his head..." Bhagavan Das is back living at Lama in New Mexico. "Truth is nowhere to be found," he says. "Go home."



The 2-record album isn't sold in stores. $6.00 to Bhagavan Das, c/o ZBS Media, RD 1, Ft. Edward, New York 12828.

—Rick Fields

Some rules and hints for teachers and students

Some rules and hints for students and teachers.

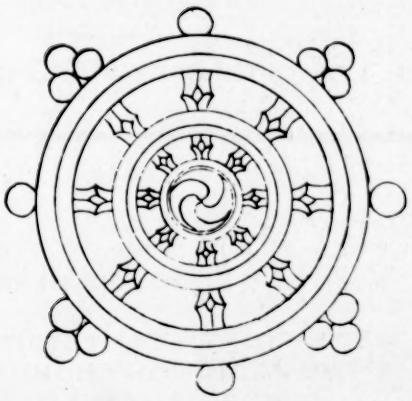
RULE ONE: find a place you trust and then, try trusting it for a while.
RULE TWO: general duties of a student— pull everything out of your teacher; pull everything out of your fellow students.
RULE THREE: general duties of a teacher— pull everything out of your students.
RULE FOUR: consider everything an experiment.
RULE FIVE: be self-disciplined— this means finding someone wise or smart and choosing to follow them. To be disciplined is to follow in a good way. To be self-disciplined is to follow in a better way.
RULE SIX: nothing is a mistake. There's no win and no fail, there's only make.
RULE SEVEN: the only rule is work. If you work it will lead to something. It's the people who do all of the work all of the time who eventually catch on to things.
RULE EIGHT: don't try to create and analyse at the same time. They're different processes.
RULE NINE: be happy whenever you can manage it. Enjoy yourself. It's lighter than you think.
RULE TEN: 'We're breaking all the rules. Even our own rules. And how do we do that? By leaving plenty of room for X quantities.'(John Cage)
HINTS: always be around. Come or go to everything. Always go to classes. Read anything you can get your hands on. Look at movies carefully, often. Save everything— it might come in handy later.

•

From Corita Kent's "Today You Need a Rule Book"— in AD/12/73 ($24.10/yr, Architectural Design, 26 Bloomsbury Way, London WC1A 2SS, England.)

Box 428, Sausalito, California 94965

BY RICK FIELDS



Beginning Buddhism

Buddhism as a tool, maybe the sharpest and kindest tool held by us sentient beings, a tool for dismantling, cutting away and through, unmasking, demystifying. A tool for tearing down and transmuting the crazy checkerboard of duality, of Yes-No, Good-Bad, In-Out.

A tool, like an alarm-clock, for waking up.

Buddha, in Sanskrit, means Awake. Maybe we could call Buddhism Waking-Up-ism, or how-to-wake. Actually I could call it whatever I want, and miss it, utterly, entirely miss it. It is not something you can call.

"When Shakyamuni (Buddha) saw the morning star and was enlightened, he said, 'I was enlightened instantaneously with the universe.' "

What, my father, my mother, and many other people, want to know, does this have to do with us; two thousand five hundred years later— we have the same problems. Suffering, birth, death, old age, sickness, sorrow. No matter how fast and intricately our machines move, we are still human. The use of Buddhism doesn't seem to be how to escape, how to become God-ized out of our humaness. It is more like something Geshe Wangyal, an old Lama with a face like beaten gold, who lives out in suburban New Jersey, told me: "Face it. Don't run. Turn around and face it." Obvious enough, in one sense. But in things "spiritual" it seems we are always looking for the way out, the melt, the union, the higher...

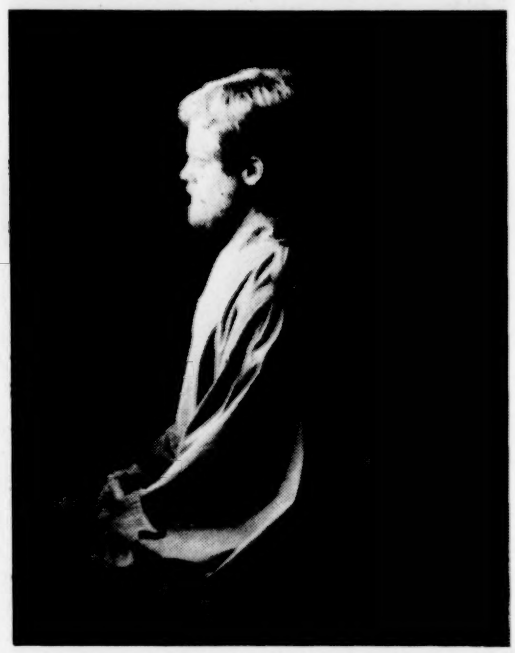
Like the man who discovered gravity, Shakyamuni Buddha got to work under a tree. What he discovered was as real as gravity. In fact, he touched his hand to the earth as witness. As solid earthy fact. What he found, after years of study with the most efficient ascetics, yogis and philosophers of his time, was that he had to work by himself. on his own mind. His own mind was the working basis. So he sat, folded his legs, folded his hands, and sat some more. As Chogyam Trungpa, Rinpoche said, meditation is manual labor.

Two thousand five hundred years ago Buddhism began in India and then migrated to China, Southeast Asia, Korea, Japan, Tibet, Sikkim, Bhutan, Mongolia. Within each country schools developed, each with their special taste and flavor. Today, almost all the schools are represented in North America. It is a unique situation. After centuries of separate developing in the hothouses of various cultures all the schools seem destined to try to put down roots in rocky, concrete soil of America.

What is emerging is a Western Buddhism, which because of the difficulty of the soil it is growing in will be that much stronger and vigorous. But it doesn't seem to me that the direction ought to be ecumenical, in that timehonored american tradition of making everything into one big cosmic stew. Rather, we need each school, undergoing the changes it must to survive in this new home.

If Buddhism is a tool meditation is the cutting edge, double-edged. It is not in its moral teaching that Buddhism has something special, but in the method of realization, of meditation. Buddhist meditation, in its most basic and common form, does not depend on either an external object or higher power. It is not mental gymnastics. Sitting and paying attention to what is there, to the mind— if mind is there. Often the breath, one's own breath, serves as a kind of a path, sword, or reminder, something to come back to. This is the central power of Buddhism. Without practicing sitting all our spiritual talk is like the squawking of hungry crows.

Regularity of sitting matters. One little trick I've used is to try and sit everyday, even if only for five minutes, even if only for a few seconds. It almost always turns out longer, of course, but it is a neat way around the mind's idea that "there isn't enough time now."



The tool of sitting is best used with some periods of longer practice than would at first seem to make any sense at all. Many centers provide a chance to experience long hours, even days, of sitting. (Usually broken by walking-meditation, work, meals, tea.) In Zen Buddhism a week-long period is called a Sesshin (mind-gathering). It is a case of quantity changing quality, of hours passing like waves through successive layers of mind. At many centers it is not necessary to be a "member" to take part in these intensive meditation periods. Use them to provide the discipline, bells, atmosphere, telephoneless quiet so hard for many of us to find at home. In Zendos (Zen meditation halls) there is often some chanting, and a style, which to a newcomer, might seem rigid. All that order, however, frees you to look right into the chaos. Another good place to experience an all-day sitting is at one of the Dharmadatu centers (see below), inspired by Trungpa, Rinpoche. The style is less formal than Zen, while following the same basic pattern of sitting and walking.

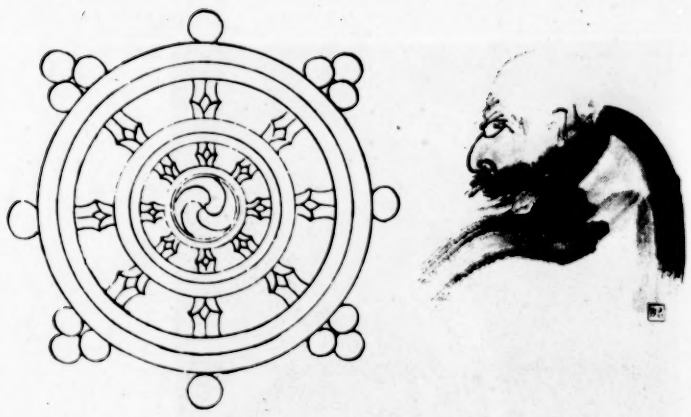
Rinzai Zen uses koan practices, in which the interview (sanzen) with the teacher plays an important part. Rinzai tends to demand a heavy commitment and training before you get to the koan. One exception to this is the Zen Master, Joshu Sasaki Roshi, who uses beginning koans especially adapted for Westerners. He seems to love to travel and holds Sesshins at various places around the country. (See Cimmaron Zen Center, below.)

Another form of intensive meditation practice is the retreat. The idea here is awesome. You just disappear. Either an apartment, a cabin, tent, cave or mountaintop are favorite spots. Cut off from entertainment and occupations you are back at the beginning. There is only one person now, and one mind, which has a way of filling all of space.

If you don't have extensive experience of meditation it's probably good to settle for no more than a week. Any longer and you need a support system, either someone to bring you supplies or a nearby, but not too near, place where you can pick them up. Tail of the Tiger, a meditation community in Vermont, provides you with cabin, stove, wood, and food for thirty-five dollars a week. They have a policy of being open to everybody; the only problem is that they are booked months in advance. If anyone knows of any other places with retreat facilities open to the public, write the Epilog. It could be a good way for a together commune to provide a needed service and make a little income.

It's good to remember in these meditation practices that body and mind become magnified. That's easy to forget when you've been on retreat for two weeks; so it might be a good idea to have someone who is relatively calm and clear stop by to see how you're doing, and remind you that you are seeing things through a high-powered microscope.

Which brings us to the teacher, guru, roshi, master. Many of us came to Buddhism in the first place because it taught a spiritual path which relied on no-one and nothing. Buddha's last words were, after all, "Everything that is conditioned passes. Be your own light." But now we find that the schools which have come West are brought here by human beings. Buddhism has always been passed along, transmitted, by one human being to another. Many of my friends find it hard to see this; as if it is somehow impure. The two poles of reaction are that it should come from 1) the gods, God, or higher forces; or, 2) be found purely by ourselves, with no outside help whatsoever. But for me the very human-ness of Buddhism is that it depends on specific people who each have their own style. This is one of the things that gives Buddhism its salty quality. It's one thing to read all those books and to space out in your own meditation— somehow it's when you run into another human being that you are shaken, grounded out of your subjective sky, and the whole process becomes more real.



It is not a matter of saying you've got to have a teacher; but of saying that teachers do exist; and can be used. That many people are put off by the idea of a teacher in a process so intimate as spiritual journey is one reason America could be considered a healthy soil for these teachings. Be as cynical, careful, wary as a fox. This said, it can also be noted that a true teacher is an extremely accurate tool for seeing yourself. A teacher acts as a mirror, but a special mirror, a 360 degree mirror, which might reflect your image back calmly, but which also might fling it back in your face. Rather than a towering demigod whose very touch blisses you out, a teacher is seen, first, as a rather stern hard-assed disciplinarian or even as a psychic martial arts instructor. A teacher could also be someone with whom you can just talk over or check out your meditation experience.

But one aspect of Buddhism that sticks is that it is an oral teaching, which is not the same as written, and somewhere along the line there must be someone doing the speaking. In Tibet if there is no living being to carry along the understanding of a school the texts go upon a shelf and gather dust.

Nearly all centers spring from the energy of a particular teacher, but many of them (though not all) may be used without having to say that this is the one. Meditation halls have been called furnaces to burn away delusions, as well as spacious meadows. They are there to be used. The real meditation hall is, of course, the one you carry with you as your own awareness.

Having been mad enough to write all this, I feel that I owe it to myself and anyone who has read this far to point out that the Dharma and the Teaching of it, is as vast as limitless space. Buddhism may be a tool, but it is a tool which can disappear in your hand, as if it had suddenly turned into the lion's roar of the whole universe.

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What We Have/What We Need

The literature on Buddhism has been building for a couple of thousand years. What is given here is a list of books and journals based on centers which are active in North America. The list is representative rather than complete. I have emphasized books by contemporary teachers.

I'd like this section of the **Epilog** *to become the seed of an on-going Journal of American Buddhism. We would like to hear from people with a direct knowledge of different centers, teachers, and special events, such as Sesshins, intensive meditation periods, seminars. There is also a growing need for information on retreat facilities.*

Short reviews of any helpful books would also be welcome. News of who is translating what. Examples of fresh translations that make the teachings come alive.

We could also list where different "meditation aids" can be found. By "meditation aid" I mean any object which helps you in your practice. Cushions, zafus, good incense, bells, butter lamps, images, silkscreens. Many centers are trying to support their practice by crafts and other "cottage industries"; a directory of who is making what. (I've long been looking for an hour glass to time sittings.)

Also, what good recordings of Buddhist music and chanting are around. Films and tapes. We could also use information on the problems of studying and travelling to Japan, India, Southeast Asia. Whatever, in short, you feel should be part of an active anthology in which we all hold a share. The Epilog will pay $10 for published reviews.

The Listings are broken down into three basic divisions, which follow the three main Buddhist Traditions, Theravadin (sometimes called Hinayana),

Mahayana, Vajrayana (sometimes called Tantrayana.) The Theravadin School is the earliest and is based on the Pali Canon of Scriptures. It now survives chiefly in Burma, Ceylon, and Thailand. "The School of the Elders" Mahayana is the Northern School, a later development based on the idea of a Bodhisattva, who vows to postpone his own entry into "Nirvana" in order to help all sentient beings. Found in Japan, China, Korea, Vietnam. Vajrayana is the Tantric school of Tibetan Buddhism.

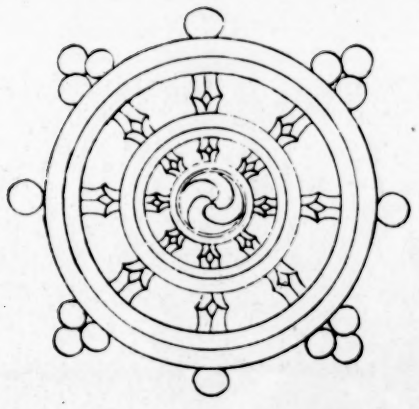
–RF

THERAVADIN CENTERS

Washington Vihara
5017– 16th St., N.W.
Washington, D.C. 20011
(202) 723-0773
The Ven. D. Piyananda Maha Thera, President. The Vihara is open daily; there is a Sunday service.
Publication: **The Wheel,** translations of Pali texts, articles by Nyanaponika Thera, Soma Thera, Conze, many practical articles relating to a modern Buddhism. Single Numbers 25 cents, Double Numbers 50 cents; also publish **Bodhi Leaves,** a pamphlet series. The Vihara Book Service, same address as above, has a useful catalogue.

Hawaiian Zen Center

Box 428, Sausalito, California 94965



The Buddhist Society
5184 Scranton Court
Denver, Colorado 80231
The Ven. Anagarika Sujata, who has received full monastic ordination in Ceylon, is Director. Classes in Vipassana, "insight" meditation. The Society holds a one month meditation retreat.
Book: **Beginning To See** by Anagarika Sujata.

Theravada Buddhist Center
16326 Chase St.
Sepulveda 91343
(213) 894-9991
The Ven. Phra Maha Theeraphen Metaviharee. American-Thai center.

Vipassana Centre
c/o The Limes, Douglas Avenue,
Hyth, Kent, England
V.R. Dhiravamsa, the Director and Meditation Master of the Centre, visits this country quite often. I've heard him speak twice, and always wanted to hear more. But I've never been able to find out where he was speaking next. He has conducted retreats at various places. He was formerly known as Chao Khun Sobhana Dhammasudhi. His books are among the best on Vipassana meditation.
Books: **Beneficial Factors for Meditation,** an elementary guide to Vipassana Meditation, preferably for beginners by Chao Khun Sobhana Dhammasudhi, $1.50. **The Real Way to Awakening** by Chao Khun Sobhana Dhammasudhi. **A New Approach to Buddhism** by V.R. Dhiravamsa, $1.50. "When we talk of 'the way of awareness' we do not mean that awareness is one thing and the way is another, or that there is a technique for applying awareness to life. Awareness itself is the doing, the practice, the action— there is no technique for being aware."
Order from the above address, or from: Dharmadatu Books, 331 W. 20th Street, New York, N.Y. 10011.

Other books:
The Heart of Buddhist Meditation by Nyapanika Thera, $3.00. A basic introduction to the "Way of Mindfulness." Includes a translation of the Maha-Sattipatthana—Sutta. From: Samuel Weiser, 734 Broadway, New York, N.Y. 10003
The Satipatthana Vipasana Meditation by Mahasi Sayadow, $1.75. "This manuscript arrived with a friend back from four years in a monastery in Thailand." A step by step guide, beautifully edited and designed.
Practical Insight Meditation by Mahasi Sayadow, $2.25. An extension and advanced study.
Both the above from: Unity Press, PO Box 26350, San Francisco, Ca. 94126.

MAHAYANA CENTERS

Zen Center of San Francisco
300 Page Street
San Francisco, California 94102

The San Francisco Zen Center was founded by Suzuki-roshi, a Soto Zen Master. The current teacher is Baker-roshi. The Zen Center also includes Tassajara, Mountain Center, and Green Gulch Farm, as well as many affiliated centers. Sesshins are open to everyone, and run from two days to seven days. There is a guest student program, which makes it possible to live at the San Francisco Center for $3.50 a day. Write in advance.

Publication: **Wind Bell,** three times a year, voluntary subscription $3.00. Wind Bell contains news of all three centers, lectures by Baker-roshi and the late Suzuki-roshi, interviews, translations.

Book: **Zen Mind, Beginners Mind,** by Shinryu Suzuki Roshi, published by Weatherhill, 149 Madison Ave., New York, N.Y. 10016. This is the book on Zen meditation, and a living Zen practice in America. It consists of informal talks given by Suzuki-roshi. It not only tells you how to start sitting, but how to keep sitting. The meditation is that of Soto Zen, "shikan-taza", just sitting, and emphasizes working with the breath. "When you do something, you should burn yourself completely, like a good bonfire, leaving no trace of yourself."

Zen Mission Society
Shasta Abbey
Rural Route 1, Box 578-A1
Mount Shasta, California 96067
(916) 926-4208

Jiyu Kennet-roshi is an English woman who has studied in Chinese Zen temples in Malaysia, and for a number of years in Japan, where she was the head of a temple, as well as head of Sojiji Foreign Guest Department, an organization that specialized in training foreigners in Zen.
Zen Mission Society concentrates on training for the Buddhist priesthood. However, they also have facilities for guests, retreats and sesshins.
Publication: Journal of the Zen Mission Society. As a "corresponding member", $12 per year, you receive twelve issues of the journal and correspond with Kennet-roshi regarding your practice.
Book: **Selling Water By the River,** A Manual of Zen Training, by Jiyu Kennett, Vintage Books, $2.45, contains translations of many Zen ceremonies, and the first translations of Keizan

Tassajara creek

Zenji. From the introduction by Chisan Koho, "The people of Western Countries also, if Zen is ever to reach them properly, must color it for themselves just as the Japanese did. Thus will Zen be reborn in the West. Like the Buddhist at rebirth, the new Zen will be neither completely new, being the same stream of Truth, nor completely old, as it will have new forms, ways, customs and culture...this book (is) a manual suitable for Western people who are sincerely seeking true Zen but not trying to copy Eastern ways and manners."

Cimarron Zen Center
Finzai-Ji, Inc.
2505 S. Cimarron St.
Los Angeles, California 90018
(213) 732-2263

This is a Rinzai Zen center. Rinzai uses koan, question-and-answer, as a central part of practice. Joshu Sasaki Roshi is the teacher; he has adapted koan practice to American students. There are Sesshins, which can be attended by non-members. Joshu Roshi is in the LA area for alternating three month periods. The rest of the time he holds Dai-Sesshins in various parts of North America. These sesshins provide, usually, ample chances for "sanzen", interviews based on koans. Write to the Cimarron Zen Center.
Publication: Newsletter, which includes talks by Sasaki Roshi.

Gold Mountain Monastery
Sino-American Buddhist Association
1731 15th Street
San Francisco, California 94103
(415) 621-5202

This is a Chinese Ch'an (Zen) center. The teacher is Master Hsuan Hua. Gold Mountain Monastery is open to everyone; practices include a wide range, from five-week long intensive meditation sessions to classes in Chinese and Sanskrit. These people get up very early in the morning.
Publication: Vajra Bodhi Sea, contains talks by Master Hsuan Hua, plus translations of Chinese texts, plus interviews and biographies of students.

Diamond Sangha
A Zen Buddhist Society
Maui Zendo
R.R. 1 Box 220
Haiku, Hawaii 96708

Yamada Roshi visits from Japan. Robert Aitkin is the Director. There is a real vitality to this group's practice, which has been especially sympathetic to "alternative culture" people. They are crowded, so write before showing up.
Publication: Diamond Sangha, especially valuable to people interested in Zen communities. Gary Snyder, and others not living in the community contribute to this valuable and enjoyable journal.

The Zen Center
7 Arnold Park
Rochester, New York 14607
(716) 473-9180

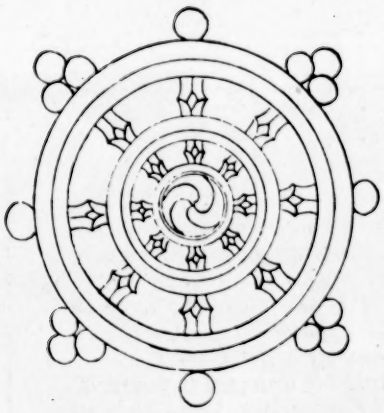
Roshi Philip Kapleau studied thirteen years in Japan. His teacher, Yasutani Roshi, taught an "integral" Zen grounded in both Rinzai and Soto. Koan study is usual for more experienced students. It is necessary to attend one of the Introductory Workshops before you can apply for membership. Sesshins are open only to regular members. There are about 25 "affiliate groups" in different parts of the country who welcome new students.
Publication: **Zen Bow**, talks by Roshi Kapleau, Yasutani Roshi, other articles on Zen Practice. Voluntary subscription rate $3.00 a year.
Book: **Three Pillars of Zen**, Beacon Press, by Philip Kapleau, gives a very complete and clear picture of the type of meditation practiced here. It also includes Yasutani-roshi's Introductory Lectures in Za zen, which are pure gold, as well as interviews Yasutani Roshi held with students during Sesshin. They are also first person descriptions of what people have gone through during Sesshin, experiencing "kensho" or satori.

Zen Studies Society
223 East 67th Street
New York, New York 10021
(212) 628-9652

Soen Nakagawa Roshi visits from Japan. His long-time student Eido Roshi leads the group in New York. Thursday evening meetings are open to the public. Sesshins are not.
Publication: Newsletter, quarterly.

New York Zen Center
440 West End Avenue
New York, New York 10024
(212) 724-4172

Reverend Kando Nakajima is a Soto Zen teacher, who has also studied Theravadin Buddhism in Ceylon. "The purpose of the Center is to provide a place for Zen Meditation where anyone wishing to sit regulary, listen to a lecture from a Zen priest, or come to sesshin once a month, may attend."



Sesshins are open to anyone who has previously practiced zazen.
Publication: Zen Life, three times a year.

A complete list of Zen groups has been compiled by Ronald W. Hadley, Box 83, Norwich, Vermont 05055, under the title "A List of Organizations For the Practice of Zen Buddhism In the United States". The typescript is 102 pages long, and includes extensive information of each group. It has been xeroxed and costs $5.80 postpaid.

VAJRAYANA CENTERS

Lamaist Buddhist Monastery of America
South Third St.
Freewood Acres, New Jersey 07727

Geshe Wangyal, who has been teaching here since 1955, gives a lecture the first Sunday of each month. The Monastery serves the interests of a local Kalmuck community, as well as teaching Westerners. There is also a Retreat House, for more intensive study with Geshe Wangyal, and a translation center, The Buddhist Studies Institute. The Retreat House is located at Box 306A, R.D.1, Washington, N.J. 07882.

Book: **The Door of Liberation,** Essential teachings of the Tibetan Buddhist Tradition, collected and edited under the supervision of the Geshe Wangyal, published by Maurice Girodias Associates, 220 Park Av. South, N.Y., N.Y. 10003. Contains translations and commentaries from the Gelugpa School of Tibetan Buddhism, especially from Lama Tsong-kha-pa.

Ewam Choden Tibetan Buddhist Center
254 Cambridge Street
Kensington, California 94708
527-7363

Kunga Thartse, Rinpoche (Sakyapa School) gives classes in meditation, Tibetan language and culture. There are daily meditations at the center.
Publication: Ewan Choden Newsletter

Tibetan Nyingmapa Meditation Center
2425 Hillside Avenue
Berkeley, California

Tarthang Tulku, Rinpoche, is a Lama of the Nyingmapa School, the oldest of the Tibetan Schools. Meditation classes, Tibetan language and culture. There is also a translation program.
Publication: Crystal Mirror, $3.50 an issue. More of a book than a magazine. Translations of Nyingmapa texts, articles by Tarthang Tulku, H.V. Guenther, and others. Issue no. 2 includes an extensive interview with Tarthang Tulku.
Books: **Calm And Clear** is a translation of an important text on meditation by MiPham, a 19th-century Nyingmapa teacher. **Legend of the Great Stupa** includes a translation of **The Life Story of the Lotus Born Guru,** PadmaSambhava, who brought Tantric Buddhism to Tibet from India in the Eighth Century. Available from: Dharma Press, address above.

Kagyu Kunkhyab Chuling
725 West 14th Avenue
Vancouver, British Columbia
Canada

Kalu Rinpoche is a Meditation Master of the Kargyu School. He lives in India, but travels to the West about once a year.
Book: The center has published **The Foundations of Buddhist Meditation** by The Very Venerable Kalu Rinpoche, a text which is written in the traditional Tibetan style. It is a pamphlet and costs $1.50. They have also published a **Continuous Rain To Benefit Beings** by The Fifteenth Karmapa Kakhyab Dorje.

Vajradhatu— Karma Dzong
1111 Pearl Street
Boulder, Colorado 80302

Vajradhatu is the name for the association of centers working under the guidance of Chogyam Trungpa, Rinpoche. They range from a community in Barnet, Vermont, Tail of the Tiger, to smaller centers in cities. These Dharmadatu Centers, which are open to anyone, hold daily meditations, as well as an all-day (Sunday) meditation, which, like the Zen sesshin, combine sitting, walking meditation and work, but in a less formal style. You can show up any time during the day, and stay as long as you like. There are also study groups and talks, which alternate with tapes of Trungpa, Rinpoche.
Publications: **Garuda,** published annually by Vajradhatu and Shambhala. Garude III is $1.95. It contains talks by Trungpa Rinpoche, as well as poems, calligraphy. It also carries material by Suzuki-roshi, H.V. Guenther. as well as people working with Trungpa. Lectures and seminars by Trungpa Rinpoche are available on tape (reel or cassette) from Vajradhatu.

Books: **Meditation In Action** is a good introduction to Trungpa Rinpoche's approach. **Cutting Through Spiritual Materialism,** also by Trungpa Rinpoche, is the most recent and most complete book. The idea of spiritual materialism, "looking for exits to turn off at because we can't bear to be where we are." is central. This is an overview of the full range of teachings, from the Four Noble Truths to Tantra.

Commentary, February 8, 1971

One student may say it will cover the whole state, and another may say it will cover the whole earth, but I would rather say, as Nanyo Echu said, "Any stone will be good enough." Even a small stone can be good enough for me. You know, which do you like– the whole world or a small stone? I rather prefer a small stone which we can carry or move. The small stone is you yourself which covers everything. If you think the whole big universe is yourself, you will be lost. It does not make any sense. You need one small room for yourself. That is very true. When you find yourself really in the small room, as one of your rooms, then there is you yourself and the whole universe is there. The whole universe makes sense to you. Without your room, the whole universe does not make any sense.

–Suzuki-roshi

"It takes tremendous effort to work one's way through the difficulties of the path and actually get into the situations of life thoroughly and properly. So the whole point of the hard way seems to be that some individual effort must be made by the student to acknowledge himself, to go through the process of unmasking. One must be willing to stand alone, which is difficult."
From: Dharmadhatu Books, 331 W. 20th St., N.Y., N.Y. 10013 or Shambhala, 1409 Fifth St., Berkeley, Calif. 94710.

Naropa Institute
1111 Pearl Street
Boulder, Colorado 80302

Faculty includes Trungpa Rinpoche, Gregory Bateson, Herbert V. Guenther, Kobun Chino, Sensei, Ram Dass, Tujhey Wangchuk. Visiting faculty includes Agehananda Bharati, Dr. Stanislav Grof, Dr. Thich Thien-An, former professor at University of Saigon, head of International Buddhist Meditation Center, Los Angeles, John Cage, Allen Ginsberg, Theodore Roszak.

"The purpose of Narpoa Institute is to provide an environment in which the Eastern and Western intellectual traditions can interact and in which these disciplines can be grounded in the personal experience and practice of staff and students." Sessions run from June 10-July 13, and July 15-August 17. Deadline for course registration, both credit and non, is April 15, 1974. Fees are $55—65 per course.

SOME MORE BOOKS

Many of the books listed here can be bought, at a discount, from Dharmadatu Books, 331 W. 20th Street, New York, N.Y. 10011

They also publish a free, useful catalogue.

Earth House Hold *by Gary Snyder, published by New Directions. Snyder inspired Kerouac's great Buddhist novel, "Dharma Bums". Earth House Hold contains the seed-essay "Buddhism And the Coming Revolution". For example: "Institutional Buddhism has been conspicuously ready to accept or ignore the inequalities and tyrannies of whatever political system it found itself under. This can be death to Buddhism, because it is death to any meaningful function of compassion. Wisdom without compassion feels no pain." In "Passage To More Than India": "A small band of Zen monks under Shaku Sokatsu (disciple of Shaku Soyen) was raising strawberries in Hayward, California, in 1907. Shigetsu Sasaki, later to be known as the Zen Master Sokei-an, was roaming the timberlands of the Pacific Northwest just before World War I, and living on a Puget Sound Island with Indians for neighbors... In several American cities traditional meditation halls of both Rinzai and Soto Zen are flourishing. Many of the newcomers turned to traditional meditation after initial acid experience. The two types of experience seem to inform each other." A good picture of practice in a Japanese Temple is given in "Spring Sesshin at Shokoku-ji."*

The Tantric View Of Life *by Herbert V. Guenther, Shambhala, $8.50. Guenther is the foremost Western interpreter of Tantra. He manages to be scholarly and passionate at the same time. Some people find him hard to read; he's not easy but well worth the effort. "What Tantra is telling us is that we have to face up to Being; to find meaning in life is to become Buddha– 'enlightened', but what this meaning is cannot be said without falsifying it. The knowledge which Tantrism insists upon is the knowledge that makes all these kinds of knowledge possible." Guenther has also masterfully translated* **The Jewel Ornament of Liberation** *of Gampopba, and* **The Life of Naropa,** *both major texts of the Kargyu School.*

Sun Buddhas, Moon Buddhas *by Elsie Mitchell, published by Weatherhill, $6.95. Elsie Mitchell memoir of her life in Zen, from Cambridge to Japan, and her meetings with teachers such as Suzuki-roshi and Soen-roshi. Available from Cambridge Buddhist Association, 126 Brattle St., Cambridge, Massachusetts 02138.*

The Message of the Tibetans *by Arnaud Desjardins, Stuart & Watkins, $4.75. The author is a French film-maker who got a guided tour around the Tibetan community in India, while making a film for French television. It is one of the few books which gives an idea of the situation of contemporary Tibetan teachers in India. While his own philosophizing is sometimes tiresome, his meetings, with masters such as Karmapa, Dudjom, Rinpoche, and Chatral, Rinpoche, make the book of great value.*

The Asian Journals of Thomas Merton, *New Directions, $12.50. Another book which gives a sense of the contemporary Tibetan teachers in India, and Ceylon. "He told me, seriously, that perhaps he and I would attain to complete Buddhahood in our next life, perhaps even in this life, and the parting note was a kind of compact that we would both do our best to make it in this life."*

–RF

BY SAM KEEN

SPIRITUAL TYRANNY

This piece is Sam's notes for the keynote speech he gave last December at Esalen Institute's symposium "Spiritual & Therapeutic Tyranny: The Willingness to Submit"— a watershed event that went un-noticed in the press. Keen is an old Esalen hand who has been doing interviews for **Psychology Today** *with the likes of Carlos Castaneda, Oscar Ichazo (Arica), John Lilly, etc. His talk was as sharp as the rousing symposium got.*

We'd like more material of this sort for **The CQ**— *critical evaluation of the various mysticism and mystical regimes, criteria for critical evaluation. They're too important to take fondly. Lawrence Ferlinghetti it was, several years ago, who advised a number of us to investigate the fascisms of love, not just the obvious Mel Lymans and Guru Maharajis, but the Gurdjieffians, Synanons, Aricas, etc. How do you recognize a bad teacher, school, philosophy, practice? How do you recognize good ones?*

Yeah it's all 1, and no it isn't.

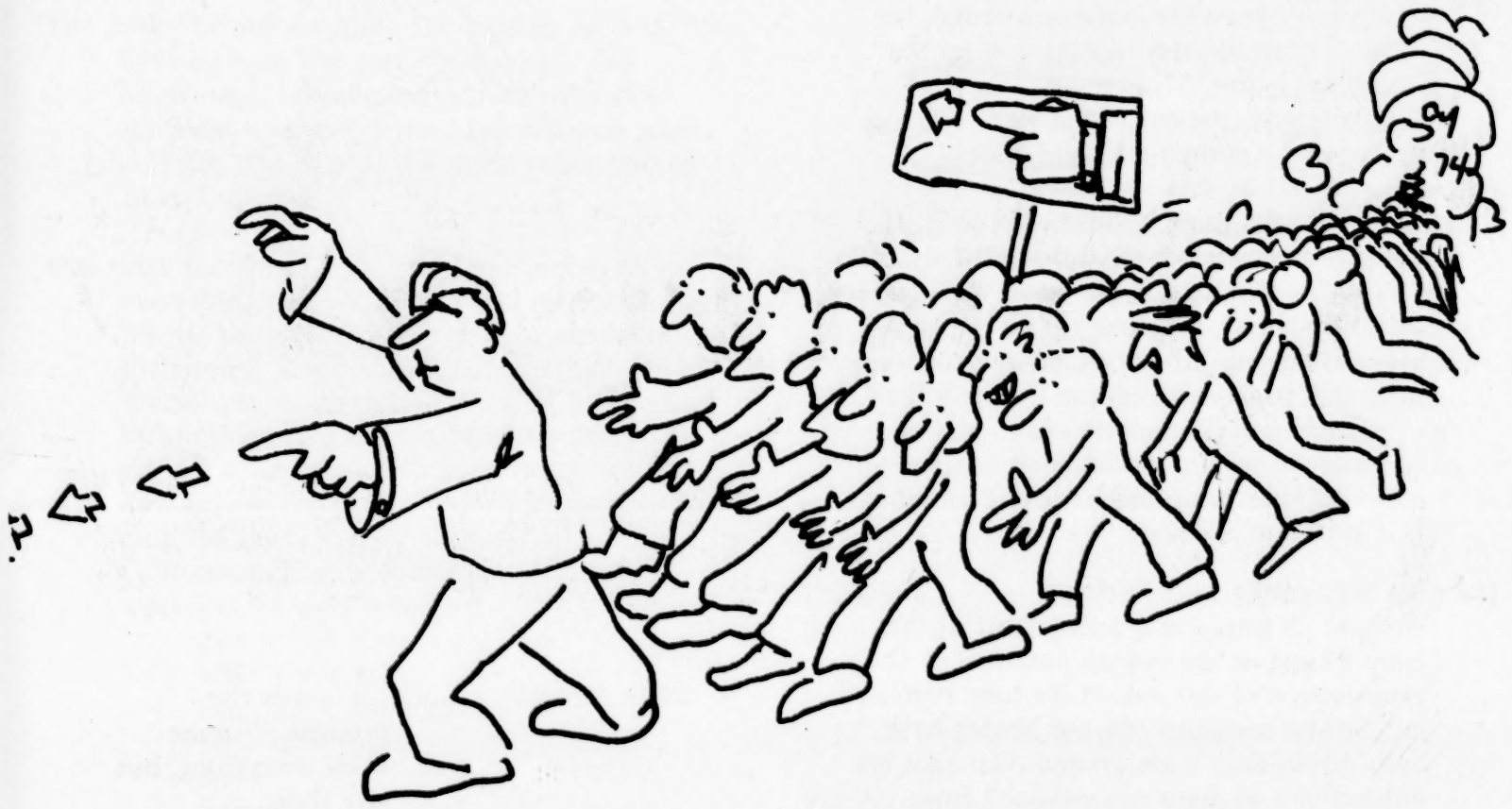
—SB

Tyranny: absolute government in which power is vested in a single ruler...rigorous, cruel, oppressive, and unjustly severe government whether by a single absolute ruler or other controling power.

We enjoy the luxury of speaking openly about tyranny because we have so little of it. We are free to shout about repression because we are not repressed. Tyranny means armed guards, terror, torture and death for the opponents of the ruling authorities. It means that freedom of speach, of assembly, of protest may have to be paid for with blood. We are not without tyranny in this country but it exists as a scab on the surface of a still somewhat democratic society...It is not our interest here to establish some index by which we could judge how much or how little political tyranny exists within our country at the moment. That is an interesting and important question; it is not the one we are primarily concerned with. We are to look at the more subtile forms of tyranny that exist within the ambiance of therapists, healers, gurus and other professional spiritual guides. We are interested in seeing whether there is corruption within our own house rather than looking for termites in the Pentagon, or chauvanism in the Establishment. Our concern is not so much what they do to us as what we do.to ourselves. our freely chosen bondage, voluntary submission.

Tyranny as metaphor.
Fascism as analogy.
We are just playing;
looking at the rules of the game.

The metaphor is political;
its a matter of governance
of the body politic
or the body.
Who controls the wealth
or the commonwealth?
Who leads the group
and who is lead?
The use and abuse of power.
Who has dominion over the people?
All power to.....?



What rules govern the game?
What are the regulation moves when we play:
Lord and liege
Master and slave
Guru and disciple
Therapist and client
Leader and follower
Enlightened and seeker?

Tyranny is:
law and order gone wild
an inordinancy in the body politic
a cancer in the organism.
A part seizes control over the whole.
There is an epileptic seizure– of power
and the head is cut off from the body.
Spiritual capitalism; everything is ruled from above.
The elite meet and decide how the mass is to be governed.
The chosen ones, the enlightened, the guardians, the shaman, the priests,
the natural leaders, the gurus, the tulkus, the philosophers, the
therapists, the strong men and liberated women– all those with
brighter minds and higher consciousnesses in whose ears god has
whispered the secrets of human nature and has shown visions of
the ideal– become the archetects of a new humanity and a new Utopia.

(Should we mention in passing that the leaders are usually male, privledged, articulate, more comely than average, and usually cool and are often more successful in public than private? No. Let's not mention that.)

And the leaders always, in theory and rhetoric, accept power for the sake of the mass. It is for your own good, you know.
The body cant be expected to mind itself.
The Children are innocent and weak; they are still asleep dreaming in the world of maya, playing with their illusions. They dont have access to the information necessary to make policy decisions. They havent seen the archetypes. They are not enlightened. They still have egos. They need help.

The first rule of the game is: it takes two to play. There must be the will to dominate and the will to submit. You can't play follow the leader without an agreement. In this game there are no innocent parties...

> Cops and robbers. Guards and inmates. I took a tour of Alcatraz. When I saw the cells and the dark isolation rooms I hated the guards. How could those bastards have administered such brutalizing punishment to their fellows. Then I thought how hard an inmate had to work at it to end up in Alcatraz. You had to be bad and badder until you proved you were the baddest-ass around. Then you got the prize– the rock, the most repressive prison

in the system. The game was brutal, but guards and inmates together set up the checker board.

Therapists require patients– and vice versa
Disciples require gurus– and versa vice

The second rule: the game begins in the mud. If there is no one who is dis/eased there is no need for a healer. So we begin with anxiety mental illness, neurosis, alienation, sin, behavioral difficulties, insanity or some such negative condition that is to be corrected. Those who are to play the part of patient or disciple must feel that they are somehow less than human, less than adequate.

The play begins with a confession:
We have all sinned and fallen short of the glory of god or the human potential or the expectations of our sisters. We have repressed our natural sexuality and our libidos have been driven deep underground. Our egos are inflated and we have not wakened from illusions. We live at minus satori levels. We still have attachments and, of course we are chauvanistic, and also a little passive-dependent. We are not very loving and we try too hard to please. We dont cope very well or take total responsibility for our actions. We are racists, classists, sexists and we are getting flabby around the errogenous zones.

The third rule is: The patient-client-disciple must be taught the rules of the game to which he is to submit if he is to be freed of his dis/ease and catch the prize of happiness. The rules are always conditional:

If you will:
repent of your sin
free associate
give up your attachments
reduce your ego
have faith in....
lose your mind and come to your senses
strengthen your ego and control your infantile emotions
release your engrams
give up your defense mechanisms
soften your character armor
let out a primal scream
meditate on your mantra
accept the perfect master
overthrow the repressors
take total responsibility for your self
follow the leader

then– you will .....(Here comes the promise. Promise them everything, but give them....

The fourth rule is: set the goal of human life so high that no one can attain it, otherwise the game would end. The ideal must be unattainable, it must always receed just when you were about to catch it.

then you will.....
receive grace
make your unconscious conscious and be free from the irrational
love freely with no fear of loss and no hint of jealousy
merge with the cosmic one
live in the kingdom of the here and now
be satisfied with reality
be clear
be open
have the perfect orgasm
be cured of neurosis
find peace of mind
discover the true path
live in an erotic Utopia
transcend the barriers which keep you from having life go exactly the way you want it to go
realize the human potential
enter into the dictatorship of the proletariat
enjoy polymorphous perversity
remain in Satori 24
reach nirvana
reconcile the contradictions
trade in all those brown stamps at the Redemption center and buy yourself a little bit of heaven.

The End. The Apocalypse. The Goal is reached. We have arrived. The game is finished. The kingdom of completion arrived right on schedual, and we all lived happily ever after. At least that is how the game was supposed to end.

One small problem. They may have promised you everything but you only got a sniff of Arpege Maybe there were a few perfect moments, a little more peace, some clarity, a hint of metaphysical relaxation, times of liberation. But nothing like the big bang; no permanent satori 24. Dis-illusioned. Now what can we do? We can try harder or switch messiahs or quit the game.
Californians have a special constitutional weakness for new messiahs:

Zen in the 50s
LSD in the 60
Encounter and sensitivity
New Left visions
Arica
Est
Etc.

But tomorrow never comes. The kingdom of Ends is not of this world. When I was 13 with one wild hair I knew beyond a shadow of a doubt that Jesus would come again and usher in the Millenium. I longed for the age beyond ambiguity. But I prayed that Jesus would wait until I lost my virginity. My prayers were answered and since that day it has been hard for me to believe in the second coming. But I never quite stopped hoping to surrender dominion over my life to some strange Lord or Lady. Even after psycho-analysis, encounter, rolfing, gestalt and a few others didnt usher in the end of time I find I am still a sucker for the game. I'll play either part– heads or tales– guru or disciple so long as I dont have to quit the game entirely. Tell me about a new wise man from the East and for a while I will wonder if, perhaps, he has the answer.

If the promise is not fulfilled why does the game go on?

The Fifth Rule is: the payoff of the game is the illusion of power. Both players in the tyranny game win because they get to remain in the ambiance of power. Its a power-game: lets pretend human beings have the power to control life. It doesnt matter whether you are the dominator or the dominated because both parties share the same illusion. So long as they remain hypnotised by the power game men and women are able to avert their faces from the terrifying impotence of the human condition. At any moment death or tragedy can wipe away all we charish and have worked so hard to make secure. No human power can make life secure. But since this is such a terrifying fact we find ways to preserve the illusion that someone can control our destiny..

There is a way to end the game that cant be won
If we see where and why it begun.

The Roots of Tyranny

Full blown the game sounds grim:
dominate or submit
control or be controled
be the wolf or be the hare
one up or one down
be the pig or do the gig
sad-ism or mass-ochism.

But it all began in so small and human a way.
And every vice is only a virtue gone to seed.
Each entered this world of giants and gods
as a squirming 6 pound 15 inch midget.
They were big and we were small
and there was comfort and security in the unequal world.
And for a lifetime the play between big and small will go on within each of us.

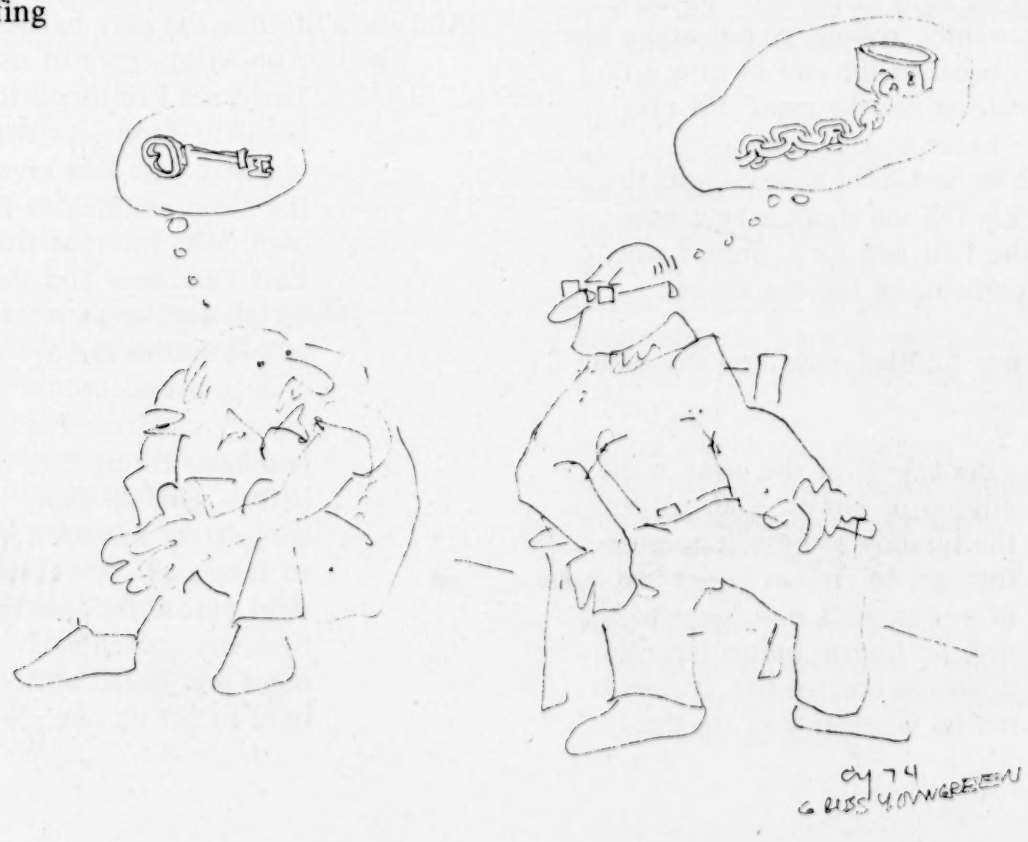
Last year I returned to a childhood home in Tennessee and went to visit an old lady who had loved and cared for the Keen children as if they were her own. Miss Inie was the only Quaker in East Tennessee and she was tart and bittersweet as a muscadine grape. She would spit in the eye of a sherrif or a college president and bake bisquits for hungry children. For over 30 years she had been taking care of her bedridden sister– now 90 years old. Miss Evie was completely paralized and could "talk" to Inny only by winking her eyes. But right before she had the stroke which took her speach away she woke one night and called out for Inny. "We have to get up and go to the old house

and clean it up and cook some chicken and bisquits for Mother. Oh, I'm so glad Mother is coming" Inny convinced her to wait till morning. By that time the dream had passed. As she told me about it Inny started crying "Sammy, Sammy, can you imagine a 90 year old woman still calling out in the night for her Mother"?
And I started crying. Because I could. I thought of my father– 9 years dead– and remembered how warm and friendly the nights of childhood were because his booming voice could hold all the hounds of hell at bay and chase away the spirits that ruled the darkness. Father, Father, who does not want a strong and wise protector? Who is so grown up as to have lost the desire for protection against the terrors of the night? The biesties and things that go bump dont wear the faces of bears or burglers as we get older. They all begin to wear the mask of death. And in the presence of that old man we are all small and impotent and we flock to Master-Father-Guru-God who promises us protection.

So the search begins for a new Father.
Lets pretend you are wise and strong
and I am your little child.
But for most of us the game gets old.
The best therapist turns out to have a clay heart.
And Fritz is a nasty old man
And Maharaji has ulcers
And Freud couldnt give up cigars
And Bill Schutz doesnt dance for joy
And Ida needs rolfing
And Tillich was a swinger
And John Lilly has migraines in his tape loops.
And the Vice President takes bribes
And Sam Keen cant dance
And it is probable that
Mike Murphy plays only average golf
And Dear Abby shoots smack and keeps a lover on the side.

God is dead
The authorities just lost the ball on the five yard line.
Our turn now.
The kingdom, and the power and the glory are ours.
Time to change sides.
We get to become the Fathers, the Giants
And once we have the power we will be as careful and careless as they.
We will pretend certainty because the smaller ones who depend on us require security.
We will pretend to have banished death because they demand immortality.
We will be heroes because life without glory is unbearable.
We will manage, control and set limits because we are good parents.
We will help and nourish because young life needs care.

After we have played both parts in the game the crucial moment comes when we have the chance to end the game– to play the end game. Whether a parent or a therapist is a good or a bad



giant depends on whether he will play the end-game when the time comes.
A good therapist, a wise giant, watches the little ones growing larger and chuckles as they get nearer the point where they will unmask his pretentions, when they will seize the kingdom and the power for themselves.
The good giant is a trickster, a koan, a screen on which the small ones project their power until they are ready to own it and claim it for themselves.
A zen tale: A young man came to a master seeking enlightenment.
"Master show me the way to enlightenment.
"Kill me" the master replied.
The end-game. The players change sides and we all sit down and laugh together: the Giants never had any power that was not ours.

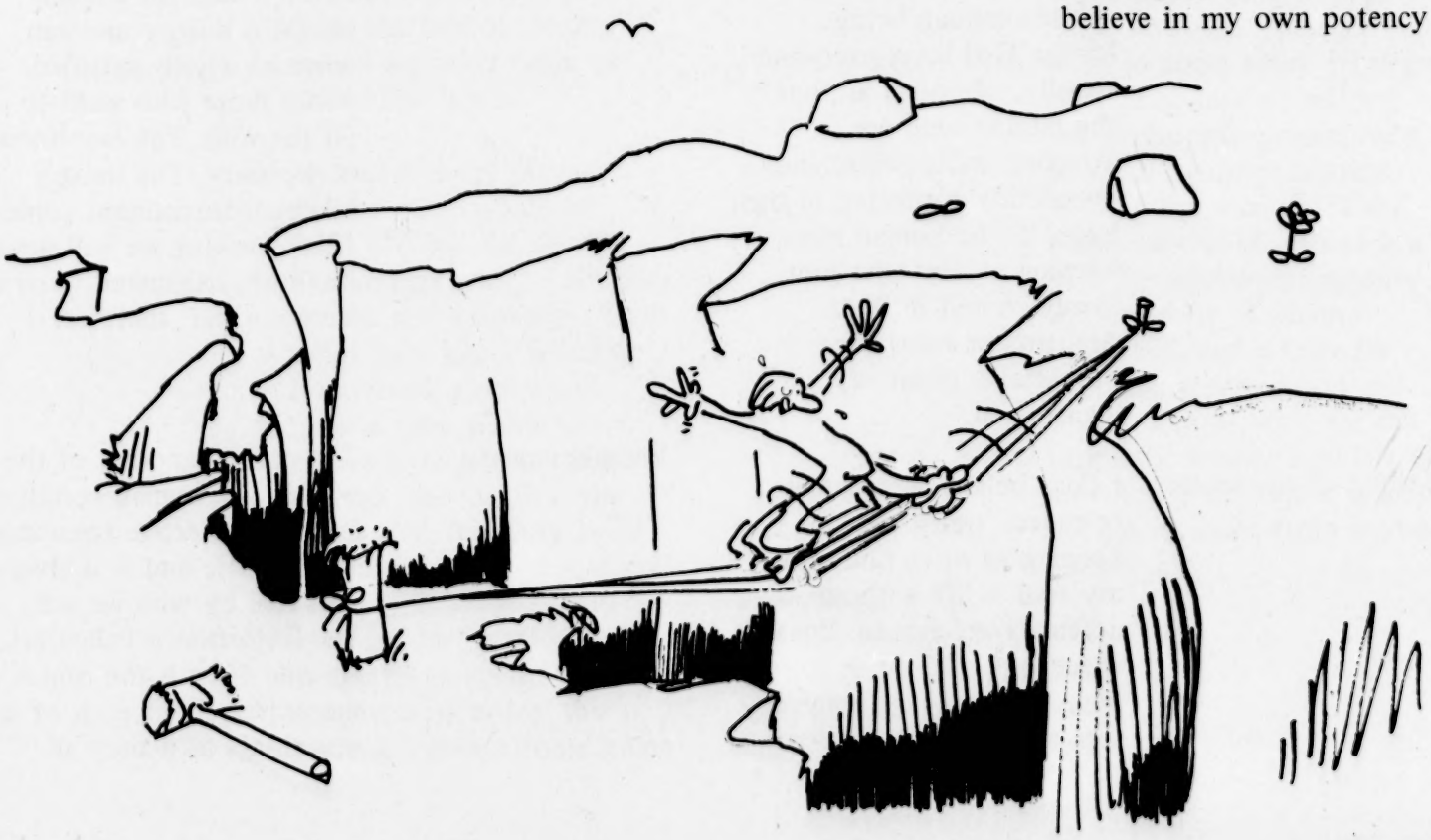
Now the game is really over.
No more big and small, I,m up and your down
No more Fathers and Mothers (with capital leters)
We found the divine virtue hidden in the vice of domination and submission.
We each need to care and be cared for
to exercise and respect power.
We have played the end-game
and now we can begin the most exciting game of all:
It is called: Equality
And that one doesnt end, because it takes a lifetime to learn to play it well.

It is so human a thing to play
big and small
follow the leader.
The chasm over the void of death is deep and the tightrope we have to walk is precarious.
The line is hard to draw between
tyranny and discipline
submission and surrender
hope and utopia
nurturing and smothering
helping and crippling
depending and dependency
faith and credulity
reason and rationalization
acceptance and resignation
compromise and betrayal,
I find I am continually seduced back into the tyranny game.
And now I can play either part with equal facility.
One of my protections is an anti-tyranny kit I keep to remind me who I am. It is filled with yes's and no's and some maybe's, things I believe and dont believe.

Anti-Tyranny Kit.

No:
I do not believe in:

The Grand Inquisitor. When I am tired I want miracle, mystery and authority as much as the next woman but the price is too high. I love cosmic security but Big Daddy always wants my freedom in exchange. I would rather believe in my own potency



some of the time than be assured of his all of the time. Submission is sweet– we all have a chapter in our autobiographies called The Story of O.– but freedom is sweeter. With all of its terror it is better to live in the wilderness than the ant heap. I dont have any confidence that the spiritual elite– god's mafia– will awaken and save the nation and show us the true way. Democracy is hazardous, but it is the best risk we have.

Getting it all together. The self cannot be unified. We are schizophrenics by nature. Spontaneity and self-consciousness do the tango within us so long as we remain conscious animals. We are amphibians living in the tooth and claw of nature and in the care-full-ness of community. Our schizophrenia is our glory, the token of our humanness.

A life without attachments. Those without attachments are free to be tyrannized, to be totally attached to the leader's trip. We love children, and friends, and places, and things because we are specific human beings. Maybe God loves everyone equally, or not at all, but the human kind are attached and partisan and beautifully contorted in their loves. To be human means keeping at least one foot firmly rooted in Boaz, Alabama or some such improbably point of incarnation.

Telling all my secrets. I dont believe in complete openness, transparence keeping an open house in my soul, a life without defense mechanisms. Private space, and secrecy, is necessary and it is a mystery that should not be profaned. If I invite you in it will be because you are special to me, and I trust you will treasure the intimacy and friendship more for knowing it is not instant and is not offered indiscriminately. To be me I must discriminate and include some and exclude others from the circle of caring.

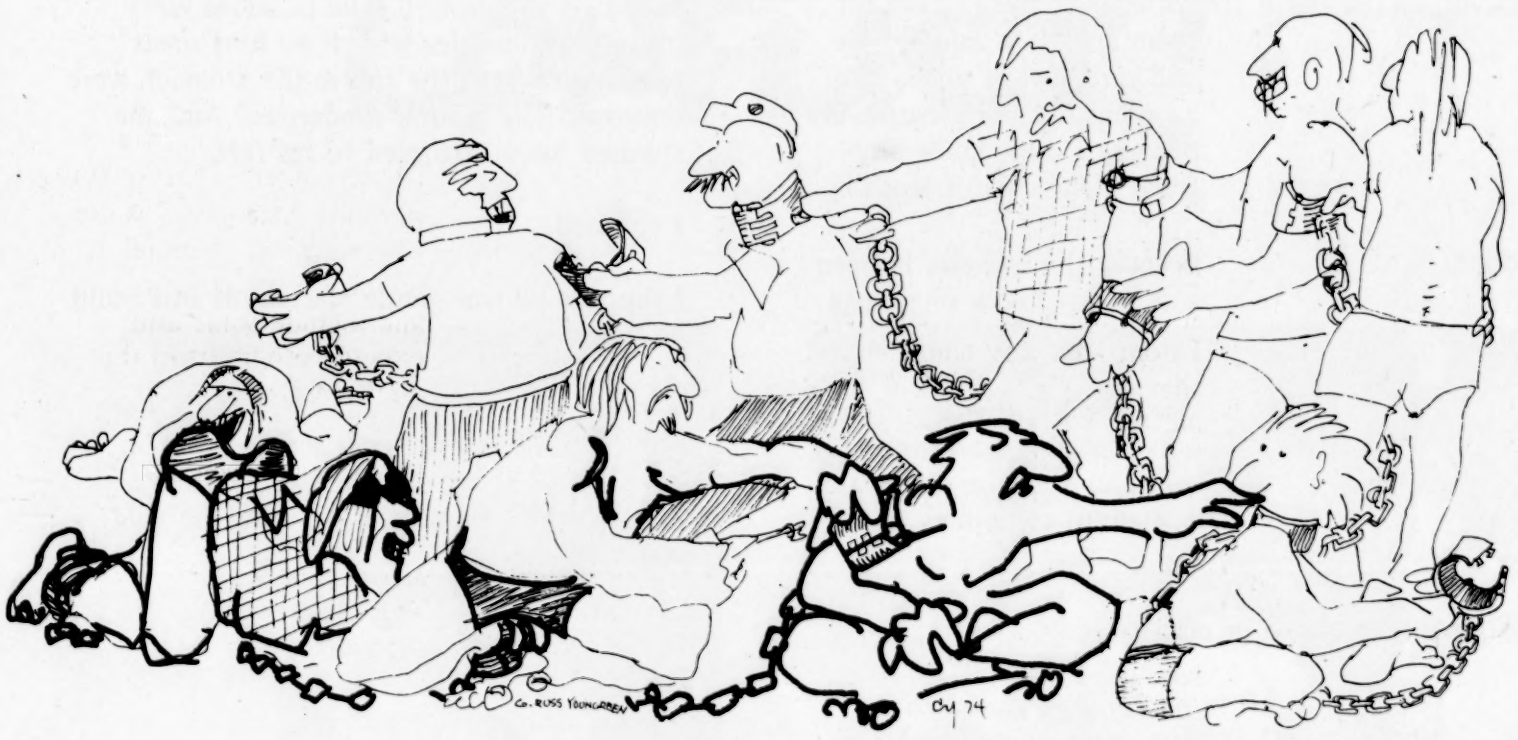
Speed. It takes a lifetime to live a life and the instant cures– weekend escalators to satori are nostrums which keep alive the hopes for permanant and easy solutions.

Reincarnated beings
Primal screams that drain the pool of pain
realizing the human potential
the perfectly rolfed body
perfect marriages
perfect masters I cant even find the perfect
pair of shoes.

Yes!
I believe in:

Permanent imperfection. Satori O. Samsara is nirvana. So long as we are alive we will be moved by dreams that are real but may never be actual. Our home is on the road. The human animal is hungry and can never be wholly satisfied. Avoid those who want to fill the void. The emptiness is necessary. The most relaible contentment comes from knowing we will never be finish, exhausted, used up. I am not yet: therefore I hope.

Endarkenment. The part is ignorant of the whole. The human condition is one of selective ignorance We see little and it is always distorted by who we are. The distortion is called art. No one of us is the center of the universe, but each of us sees things as if they all



revolved around him. It is folly to believe we can see from everywhere or nowhere. We filter all knowledge through our autobiographies.

Death.

Because it is more certain than all the theories which invite us to disbelieve in it. And because so long as we evade the fear of coming to an end we never begin or never begin again.

The ego.

Because it is my playmate and the game would be forfit if it left me altogether. This strange entity I am has a name and a history– I am called Sam Keen. Whatever is universal, cosmic and beyond time within me is always homogenized with the ego, the identity, the continuity, the story I call myself. I blend and lose my boundaries in dreams, in love, in play, in those delightful moments of self-forgetfulness but in the evening I always come home to the hearth of my self-consciousness. Rather than ridding myself of my ego I would like to appreciate it more, applaude my own drama more whoeheartedly.

Time.

Life is the teacher and the years are the path. The major discipline is negotiating those turbulent passages that seem to come every 10 years or so. The task of making the young into prematurely peaceful beings is comical. Wisdom is a vice at 20 and a necessity at 60. There is a time for adolescent insanity and the folly of second childhood, and a time for planning, renunciation and work. Most of what we call happiness is only a matter of knowing what time it is and not taking clues from anyone elses clock.

Friendship.

Dad and Mother, Lawrence, Ruth Ann, Jackie, Heather, Lael, Gif, Howard, Michael. Anne, Eliza, Linnea, Susan,

David, Grace and a 100 others. Because I care for them and they care for me and care always smells like an unmistakable person. And because I dont know anything higher than friendship.

Hope. Because the universe is open and I dont know what may happen and the realist things turn out to be unreal and vice versa. And I cant figure out what this crazy drama is about so I may as well trust it is about something good.

Life cant be tamed or controled.

When I was 16 years old, and possessed of more answers and less experience than I now have, I wanted with all my wanting to be a rancher. I reverenced everything that smelled of horse or saddle leather. One shrine I visited regularly was a small corral at the back of a do-nut shop on the Philadelphia Pike in Wilmington Delaware– an improbable place for an epiphany. A stallion lived there in an enclosure hardly large enough for a backyard barbaque. Most afternoons after school I went to visit him. He must have been 17 hands high– chestnut colored with a wide blaze in the middle of his nose. His muscles danced wildly inside a shining coat. He was, altogether, a horse fit for a minor divinity to ride into battle. Once when his owner allowed a friend to take him out of the corral I got to ride him in a large field down by the river. It was like all the outlaws in all the movies riding toward freedom. That is, until he sniffed a mare in some unknown pasture and took off like hell. The owner finally had to rescue both of us, and he returned my friend to prison and was none to happy with me for not being able to control the stallion. Not long after, the owner decided the horse would have to be gelded. He wasnt safe to keep in suburbia. And he asked me if I would come on the following Saturday to help the vetrinarian with the job.

Do you leave your god to suffer alone
Or share his pain?

For some reason that took half a lifetime to understand I went.

The vetrinarian arrived, gave the necessary shots to deaden the consciousness and the pain. The stallion was eased off his feet and rested on the ground. The incisions were made. The testicles with their long roots reaching up into the fire in the stomach were removed. The wound cauderized. And the stunned horse struggled to his feet.

I vomited.

I suppose he was gentle afterwards and could be ridden. I never went to visit him again.

I wish I had not shared in the violation of that Saturday morning. It seems better to fail a hundred times to be thrown time and again to the ground than to tame the wild god.

•

CONFLICT!

The Birth Book Whole Earth's "gratuitous crotch"

Vs.

The Birth Book **Harper's'** "gratuitous cliche"

It embarrasses us occasionally that Whole Earth comes off so sweet all the time— where never is heard a discouraging word, etc. No more. We hereby re-open the Complaint Department with our account of The Great Crotch Beef.

We sought out **Harper's.** *The magazine has been revitalized lately with Tony Jones' access-to-quotes-and-tools "Wraparound", with the writing of Annie Dillard, William Irwin Thompson and Kurt Vonnegut, and with interesting covers. Over a year ago I queried* **Harper's** *about running my interview with Gregory Bateson, which eventually they did, astutely retitling it "Both Sides of the Necessary Paradox".*

Tony Jones asked if I would guest-edit the "Wraparound". Last summer I said OK, if I could do a preliminary **Whole Earth Epilog** *and be paid what he gets paid for a month's work and have the kind of freedom I give guest editors— complete. OK's all round. It would be in the April '74 issue, fifteen pages worth.*

It worked out pretty well. Good relations with Tony. No need to go to NY. Last minute changes handled adroitly by the magazine. Generous supply (at cost) of 38,000 extra "Wraparounds" for **CQ** *subscription teasers. Grudging permission to print in* **Harper's** *the amount* **Harper's** *paid us ($4,200).*

Then came word we would have to change the photograph with **The Birth Book.** *(Remarkable book, $6, from Genesis Press, Box 877, Ben Lomond CA 95005, or Whole Earth Truck Store.) Change to what, we asked. Well, to this other here, very close.*

(Understand, by the way, that having a guest editor is no picnic. It's an invasion of everything you hold dear. I went through it when Ken Kesey and Paul Krassner guest-edited "The Last Supplement to the Whole Earth Catalog". Who ARE these people? I let them on the porch and they take over the television, the refrigerator, and the BED. They're sloppy. They're taking advantage. They're laughing at me. The fucking gypsies are cuckolding me and I'm supposed to pretend I'm glad.)

This other, very close, won't do, we said.

We said: It's a cliche, smiling mother with baby— not very discernible, that baby, and there's better smiles elsewhere in the book. Our photo is an emotional look into the very eye of birth and motherhood, sexy business yes indeed, but that's what the book says about it. Look at her face. We said: You're censoring us, diluting us, breaking your word, violating our editorship. And the women here prefer that first picture.

They said: It's a gratuitous crotch, which will offend our readers, whom we know a good deal better than you. The second picture is essentially the same, just seconds later, and the presence of the baby redeems its social value. Kindly remember this is not your magazine. And the women here prefer the second picture.

Reader, you choose. A vote for us: $6 for a year of **The CQ** *to 558 Santa Cruz Ave, Menlo Park CA 94025. A vote for them: $8.50 for a year of* **Harper's** *to Two Park Ave, New York, NY 10016.*

*(***Harper's** *got their way with the change. We got a story, sordid as it is. Your typical case of East Coast arrogance versus West Coast...* arrogance.)

—SB

Supplement to the Whole Earth Catalog

The CoEVOLUTION Quarterly

Pam Cokeley and David Wills

Credits

Editor, Stewart Brand; **Managing Editor,** Andrew Fluegelman; **Research Editor,** Diana Shugart; **Copy Editor,** Pam Cokeley; **Religion Editor,** Rick Fields; **Subscriptions,** Robbie Welling; **Illustrations and Paste-up;** Steamboat, David Wills; **Type-setting,** Joe Bacon; **Copy Photography,** Marinstat; **Additional Illustrations,** Russ Youngreen; **Cover Art,** Arthur Okamura; **Color Separations,** Gregory & Falk, San Francisco; **Printing (Body),** Fricke-Parks Press, Fremont, Ca; **Printing (Cover),** Graphic Arts of Marin, Sausalito; **Catering Facilities,** Fairbanks-Parker.

Costs

The cost (estimated) of producing the first issue of **The CQ** (5000 copies) was:

Office (rent, util., phone, postage, travel, supplies)	$ 720
Salaries	3100
Research	200
Reviews	600
Production Supplies	400
Graphics	200
Printing (body)	925
Printing (cover)	575
Color Separations	125
TOTAL	$6745

These figures do not include the costs of processing subscriptions and of newsstand/bookstore distribution, which we will publish in the Summer issue.

Subscriptions

If you're really going to clip this subscription form, this is your last chance to read page 95.

The CoEvolution Quarterly
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Whole Earth Truck Store

558 Santa Cruz Ave.
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Purpose and Philosophy

The Whole Earth Truck Store exists as a supplier and source of books, tools and information which allow people to become better acquainted with the world around them. We supply goods for urban and rural survival which promote cooperation, independence, self-sufficiency and the ability to expand control over one's own life and environment. To the extent that it is possible, we carry goods that people need rather than items which they simply want; we do not carry stuff we consider to be frivolous. We are a relatively small group but we take the time to evaluate all goods that we carry on the basis of four criteria:

1) utiliterian aspects
2) high quality or low cost
3) durability and/or prolonged usefulness
4) stimulating of reaction and inquiry

What we carry

Through the mail:

Books and merchandise listed in **The Last Whole Earth Catalog**

Books that appear in **Harper's Magazine** WRAPAROUND, April 1974

Books that appear in the first issue of **PLACE** magazine Vol. 1, Number 1

In the store:

All mail-order goods plus: Many more hardware and tool items such as Ames garden tools; hunting, pocket and kitchen knives; clothing; woodworking tools; food grinders; kerosene lamps and woodburning heaters. Many more books as well.

Health	Shelter	Farming
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Drugs	Ecology	Native Americans
		And more...

Nuts and Bolts

Ordering through the mail:

—include a list of the goods you want
—include full payment for the goods at the price indicated. Enclose a check or money order; cash has been known to get lost in the mail. If you have an outdated publication add some money for inflation. We will refund or credit you for any overpayment.
—if you live in California add 5% sales tax. Periodicals are exempt from sales tax.

In the Store:

We are located in downtown Menlo Park: 558 Santa Cruz (off El Camino).

We are open from 9:30 am till 6:00 pm Monday thru Saturday, Thursday nights till 9:00 pm.

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Tom Gage
Whole Earth Truck Store

Getting Work with Whole Earth

All we do is evaluate and write and organize and publish— 70% evaluate, 10% write, 10% organize, and 10% publish.

Evaluate-and-write you can do from where you live. If you think something would be good for the WHOLE EARTH EPILOG, suggest it. If you know it's good, review it. You get $10 and credit for each review and first-suggestion used.

If you show considerable skill in evaluating and writing about a particular subject (or number of subjects), you may become the research czar of that domain, and we send research material to you and pay you by the hour. (Until a better czar comes along.) Sometimes a research czar takes over the editorship of a part of the CATALOG, as Lloyd Kahn did with the "Shelter" section.

Then there's getting stuff in **The CoEvolution Quarterly**. *$10 per short letter (more for more). $10 per item sent that we reprint (article, paper, etc.) $50-100 per original article, paper, photo spread, drawings, etc. If you demonstrate a whole working network of unusual and relevant people and goodies, you might get a shot at guest-editing an issue of* **The CQ**— *$5/hr and POWER.*

Occasionally **The CQ** *is edited and produced somewhere at large in the world— we've done two in various deserts.*

We're also hiring— gradually— essential functionaries such as layout people (40 hr weeks during productions; complete vacation between). We need a professional indexer to prepare the comprehensive index for EPILOG and CATALOG. A photo technician for the copy camera and photostat machine. A meticulous keeper of the update department. Pay runs $3.50–4.50/hr depending on experience and time working here.

We hire for office work strictly on a combination of blazing competence and gentle congeniality— low vibe. We're too busy to supervise each other. Decisions tend to be individual or at most two-person. Employees keep their own hours and set their own vacations.

If you're thinking about an office job here, send some of your work first (to Box 428, Sausalito CA 94965), then arrange for an interview. We're hiring slowly.

Reviewing for Whole Earth Epilog

Give the information you would like to get. This should include what the item is good for, how it compares with others, and some clue of how competent you are to judge. If you're passionate about the subject, be passionately informative. And succinct.

Avoid comments like "This is a good book." Prove it...

> *With this remarkable book, a shareable investment in equipment, and a few days of work, you can fill your life with a celebration of bells. No author, not even Enzian, has a wider experience of Tibetan Bell Casting than Slothrop, and none have prepared a text so comprehensive. His diagrams alone suffice to make bell-casting understandable to the beginner. The bonus of clear prose and exotic tales make this one of the great adventure books of craft. After comparing both the French and Russian techniques — long considered the height of bell-casting — I'm forced to agree with Slothrop that the Tibetans have the most direct method of ringing the Inner Ear of the mind. Bell-casting materials are not expensive. The author evaluates the various suppliers of North America.*

Do not rave about an item which is merely good or only the best of a bad lot. Also don't waste time picking nits with the author unless the matter is something the reader has to know about. If the item is bad, don't review it. Tell us why it's bad and what's better.

Write as you would in a letter to some specific person you respect and like. As they used to say at **Life**, *"Never underestimate the reader's intelligence. Never overestimate the information he has to go on."*

Resist showing off or making funny. Also resist impersonal gray business prose. YOUR FUNCTION IS TO PERSONALLY INTRODUCE THE ITEM AND THE READER TO EACH OTHER AND GET OUT OF THE WAY.

The savvy reader will make most of his judgments on samples from the item— quotes, illustrations, etc. Select good ones. Mark them as you read through the item — bits you didn't know before, bits that contain the essence of the item, bits that pass on a whole useable idea to the reader. A perfect selection of excerpts — six or ten short ones — should gut the item, make reading it unnecessary.

Study some reviews and excerptings in **The Last Whole Earth Catalog**.... *Do better.*

Box 428, Sausalito, California 94965